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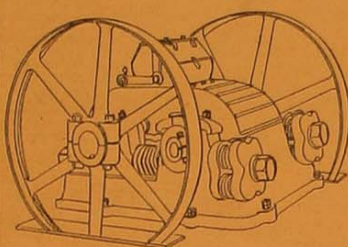
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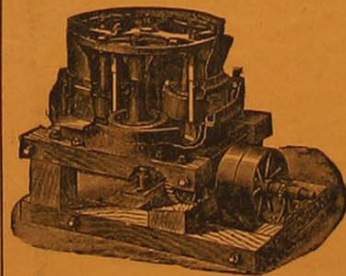
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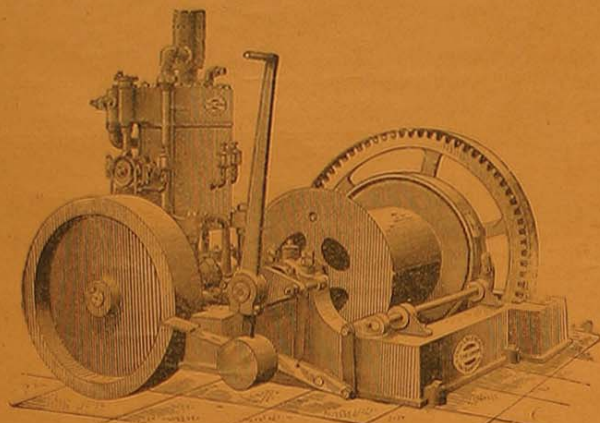
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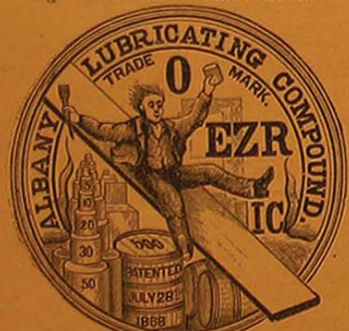
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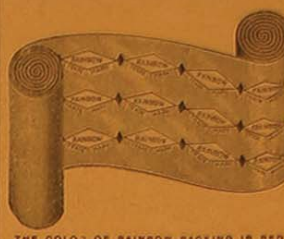
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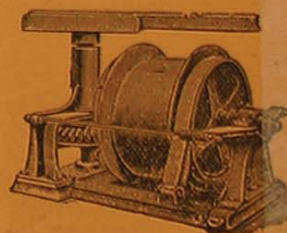
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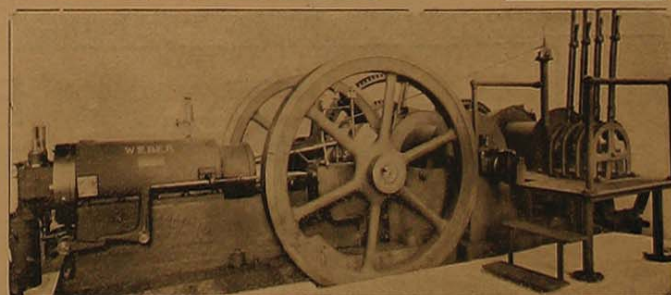
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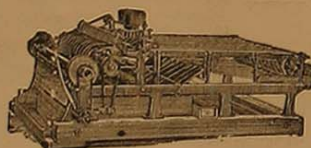
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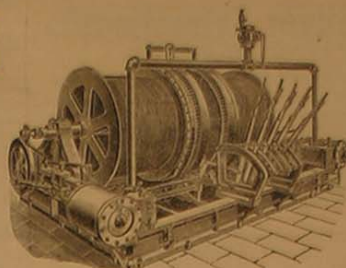
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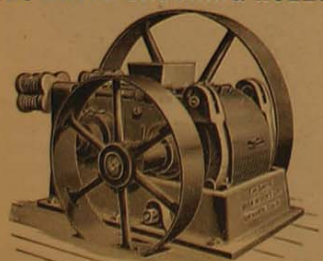
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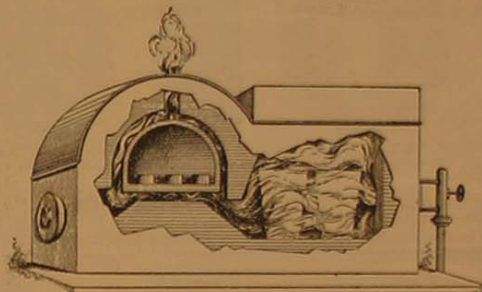
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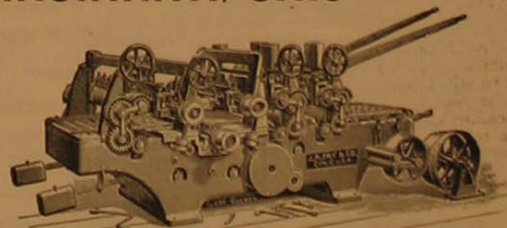
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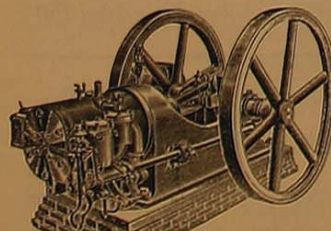
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ADVERTISING RATES FURNISHED ON APPLICATION.

The *Mining and Scientific Press* of the 5th ultimo, under "Concentrates," asks the following; "A Colorado assayer asks a practical question, which, after considerable inquiry, 'Concentrates' is unable to satisfactorily answer. He questions: 'Is an electric furnace for making crucible assays practicable?' It would seem that where fuel is dear, electric energy cheaply procurable and a large number of daily fusions made, it should be, but know of no one manufacturing such a device. Probably some of our readers can supply the information."

The Ahearn Electric Heater was invented some years ago by an electrician named Mr. Ahearn of Ottawa, Canada. It has been in use for years for heating street cars, churches, dwellings, baking and cooking uses. It is claimed that a high heat can be obtained by its use for such purposes as roasting ores and possibly assaying. The use of this invention transforms a water power into a coal mine. The inventor's rights for the United States were, it is understood, purchased by the General Electric Company, to whom application ought to be made. The benefit which the introduction of the Ahearn Electric Heater would give to many mines in the West where water power is available and fuel high priced, would make its use economical for roasting ores and heating buildings, and possibly for assayer's use. As it takes but fifteen minutes to heat a cold baking oven to a baking heat, it does seem possible that a white heat for assaying could be obtained. It seems strange that the large application of this invention, with its great capabilities, to the requirements of the mining industry of the Western States, especially where fuel is expensive and water power available, have not been made long before this date, and the attention of the manufacturers is called to it.

As the cold season has arrived when nitroglycerine powders in the form of giant powder, dynamite, dualin, etc., are liable to

freeze and become hard when the temperature falls below 42 degrees Fahrenheit, and become inactive if used in that condition, it is therefore necessary to resort to the thawing-out process by increasing the heat. If this is done by the radiation of warm air in front of an open fire, it has the effect of causing the nitro-glycerine in the cartridge to collect on the surface or paper covering, and if the heat is allowed to be excessive, to collect in drops, which when overheated either take fire or explode. Every mine manager ought to prohibit this manner of thawing powder, and discharge the man who does it in that way. The proper and safe way of thawing powder is to have a kettle with hot water outside of an inner and smaller kettle, on the plan of a carpenter's glue pot or a farina kettle, with tight closing covers, and place the powder in the inside one, having first placed dry sawdust, or infusorial earth, or fine dry sand in the bottom of it, to absorb any oil from the cartridges. This should never be placed on the fire, but filled with hot water and protected so as to retain the heat as long as possible, and to avoid having to empty it and refill it too often. The habit of thawing powder in a sack on top of a boiler, or in a blacksmith shop or mine office, is a custom which is fruitful of accidents to life and a great cause of fire. Placing the powder in hot water or in steam is equally dangerous, as it is sure to cause the oil to exude. Many of the powder companies sell proper thawing boxes or kettles made of zinc, and recommend their use to consumers, so that there is no excuse for the mine manager or owner who does not provide such an appliance and see that it is used.

The partisan policy of certain capitalists who control certain western railroads has been a prominent feature in the recent election. To secure the election of governors, members and State officials, who would be subject to the will and bidding of the railroad monopoly was the object aimed at. The old axiom that "it is less trouble to own the State Government than to gain the influence of the whole State" was the line of action taken. It is this unpatriotic, selfish, blind, policy which has retarded the mineral development of the west outside of Colorado and south of the Great Northern line. So intimately is the mining industry dependent on railway lines that the operation of many mines is simply a question of freight rates to market for the ore produced. When the policy of the railway officials is to charge "a rate of freight importunate to all the traffic will bear" the position of the mine owner is not an enviable one. As a rule all the large metallurgical works of the country are in the eastern or middle States. The mineral products of the west require transportation to the Pacific coast for shipment abroad or to the smelters and refineries of the east. But the railroad policy is not always a large amount of freight in minerals and small charges with increased traffic, but a small amount of business and large profits is preferred. For the last reason mentioned the southwestern mining interests have been retarded, and on account of more liberal rates charged by northern roads in Montana the mineral traffic of that State amounts to many millions annually. The roads which have received the largest amount of bonus in the form of land grants from the Government are those which have done least to aid the mineral development of the country. This nar-

row minded feeling which discriminates against the development of the mining industry is a serious loss to the southern railroads who ought to encourage the erection of smelting and refining works on the Pacific coast and increase their own income from freights.

It is already announced that an extraordinary session of Congress is to be called to convene immediately after the fourth of March next.

The session to commence on the first Monday instant is limited by law, and the present Congress becomes *functus officio* at 12 o'clock M. on the 4th of March. There are about eighty working days should there be no recess during the holidays. There is the usual work which must be done, among which is the passage of the twelve appropriation bills, most of which involve questions more or less important, and besides there are many matters of routine to be disposed of. There will be no time to take up and thoroughly consider the grave matters which recent events have brought forward.

Governments for Hawaii and Porto Rico will have to be provided and for Cuba almost certainly, and probably for the Philippines. There will be no time for the proper consideration of these questions during the impending short session.

The Republicans will have control of both branches of Congress as well as the executive department, and they are committed to the proposition of committing the Government more thoroughly to the gold standard, to use the language of Secretary Gage, and this involves the retirement of the greenbacks and treasury notes, the repeal of the provision of the recent revenue act which requires the silver bullion in the vaults of the treasury to be coined into dollars, and in some way the ultimate retirement of the silver dollars held in the treasury and in circulation, and lastly turning over to the banks the sole privilege of supplying the country with paper currency.

These changes are radical and sweeping and unquestionably will receive strenuous opposition. The greenbacks, as they were invented during the war, are regarded as patriotic money, and the people have ever regarded them with affection. They will dislike to part with them. Turning the power to supply currency over to the banks will revive memories of the old United States bank, and of Jackson's heroic and successful war upon it. The friends of the white metal will not be asleep, and hence we repeat that the schemes of the Bankers Alliance and Mr. Gage will be stubbornly resisted.

No doubt there will be Republican members of both branches of Congress who hold opinions not in accord with the program, and the question is will they be dragged into its support? It will be good political strategy to get the money question out of the way in 1899, that it may not rise up like the ghost of Banquo in 1900.

Should the plan be carried into execution it will not have been in operation long enough to disclose its merits or demerits, and therefore may not become very much of a factor in the next presidential election. The subject will have to be discussed as a theory and not from practical results.

The program contemplates making gold coin of American coinage the only legal ten-

der money. Bank notes have never been made legal tender in this country, and that quality cannot be imposed because they are the obligations of private parties or of corporations which, in law, are artificial persons. The holding is that the Government can make only its own obligations legal tender.

The bank notes will be made redeemable with gold coin, and therefore the banks will have to corner the gold in order to sustain the credit of their notes. The volume they will put out must be regulated by their ability to redeem, and the grave question will be whether they can control gold enough to enable them to float a volume of paper sufficient to supply the needs of our immense and rapidly increasing domestic commerce?

THE REDUCTION WORKS FOR SILVER ORES AT ADUANA, SONORA, MEX.

BY MILTIADIS TH. ARMAS, FORMERLY ASST. SUPERINTENDENT
(Concluded from our issue of Nov. 15th.)

ANALYSIS OF A BRICK OF CONCENTRATES

SiO ₂	22.4
Fe	4.2
Al ₂ O ₃	4.0
CaO	4.0
S	11.4
Pb	16.6
Cu	8.6
Zn	20.6
As	2.1
Sb	2.4
Ag	0.52

Smelting.—All the ores of a grade superior to 130 ounces per ton, as well as the concentrates, are smelted in a water jacket furnace of the following dimensions:

Diameter	39"
Capacity	40 T
Number of tuyeres	6
Root blower	No. 4
Blast pressure	1½"
Number of revolutions per minute	between 100 and 120.

Volume of air blown per revolution.....13 cubic feet.

Diameter of blast pipe.....14"
The ores smelted were complex. The chief difficulty arises from the high per centage of Zn, As and Sb.

Analysis.—

IRON ORE.

SiO ₂	6.6	SiO ₂	23.2
Fe	57.0	Fe	41.0
Al ₂ O ₃	3.2	CaO	5.6
CaO	2.1		

LIMESTONE.

SiO ₂	10.0
Al ₂ O ₃	0.8
Fe ₂ O ₃	3.4
CaO	47.0
CO ₂	37.0
H ₂ O	1.8

I will not describe the details of smelting, because they are so well known, but only mention the difficulties with which they had to contend.

As we go deeper in the mine the ore is becoming more blendiferous. The concentrates also proved to be rich in zinc. No roasting of the ore could be done successfully, as the losses in silver by volatilization were great, as is the case with rich ores.

For the zinc there is only one remedy in ordinary smelting, that of diluting it with a large amount of slag. Slag containing more than 8 per cent of Zn did not give satisfactory results, but a large amount of slag, cost in fuel, time and iron, neither of which is

cheap. On the other hand, as we had to contend with Indian unskilled workmanship, we are liable to be the victims of their carelessness, especially with ores containing such a large percentage of Zn and As.

The speiss formed (As₂Fe) is not readily fusible and not liquid when melted, forms hearth accretions, and prevents a good separation of lead. To prevent this it is necessary to select a slag that requires a great heat for its formation, and fuel is dear in Aduana. Furthermore, any neglect of the Indian at the tap-hole, for instance, by not keeping it in the proper level and nearer to the hottest part of the furnace, is liable to cause the speiss floating on the matte to chill. The scarcity of iron ore and fuel, and the accidents mentioned above, compelled us to resort to matte smelting with as little flux as possible, trying, however, to obtain all the silver in the base bullion as long as the hearth was kept in good condition.

By operating in that manner we could get rid of the greater part of Zn and As. In a second operation, resmelting the mattes, most of the lead and silver were recovered and the mattes themselves reconcentrated to about 40 per cent of copper, which would pay very well to export.

In direct smelting, counting accidents and the large consumption of fuel (about 26 per cent) to say nothing of the losses in silver by volatilization, the cost was greater than by smelting first for mattes and then re-smelting the same. Indeed, the latter required a lower temperature, was easier to smelt and did not cause important volatilization of silver. The consumption did not exceed 23 per cent in both operations together.

In direct smelting, when it was attempted to extract the greater part of the silver, the matte could not be exported at a large profit. The figures below indicate the composition of mattes by the first and second methods of operation:

DIRECT SMELTING.

Mattes.	A	B
	Per Cent.	Per Cent.
Cu	29.0	27.6
Fe	28.1	27.9
Pb	12.9	15.1
S	22.7	20.9
Zn	5.3	4.8
Ag	227.5 oz. per ton.	169.0 oz. per ton.

BY THE METHOD OF SMELTING FIRST FOR MATTE.

	C	D
	Per Cent.	Per Cent.
Cu	42.8	41.9
Fe	21.0	20.4
Pb	9.2	10.1
S	22.1	23.4
Zn	2.0	1.9
Ag	97.5 oz. per ton.	130.0 oz. per ton.

TABLE OF LEAD BULLION.

Number of Pile	Weight in Mexican Pounds	Ounces per 300 Pounds	Ounces Contained
8-1	4,084	46.6	634
8-2	5,380	38.8	695
8-3	5,795	54.6	1,053
8-4	5,526	50.0	920
8-5	8,058	45.0	1,206
8-6	6,745	51.0	1,143
8-7	5,948	56.0	1,108
8-8	7,375	50.0	1,225
8-9	7,465	48.0	1,190
8-10	6,435	50.0	1,070
8-11	5,264	53.0	928
8-12	6,018	48.5	970
8-13	5,598	50.0	930
8-14	5,535	66.0	1,214
8-15	3,852	56.0	720
8-16	3,674	45.0	550

No automatic separation of slag and matte was made.

The slags did not carry more than 1.3 ounces per ton.

The charge was prepared in stalls, in thin alternating beds, so as to insure a more nearly perfect mixture of the ore and fluxes.

The charcoal was of mezquite wood and could stand well the crushing effect of the charge. Its price varied from \$2.50 to \$2.75 per 300 pounds.

Iron ore cost from \$1.25 to \$1.75 per carga of 300 pounds.

Cupellation.—For the extraction of the silver from the base bullion and the sulphides from the lixiviation, no modern methods could be applied on account of the local conditions and because of the first expense, which the Company would not permit. Cupellation, however, is a very effective process, and the Mexicans are quite experts in handling it. The loss in silver did not exceed 0.7 per cent. We used the English cupel. Dimensions: 46 x 59 inches.

The lining was made of a mixture of limestone and decomposed rhyolite, in the proportion of 100 of the former to 46 of the latter.

Its composition is as follows:

	Decomposed Rhyolite.	Limestone.
Si O ₂	51.0	10.0
Al ₂ O ₃	18.6	0.8
Fe ₂ O ₃	15.4	3.4
Ca O	2.2	47.0
H ₂ O	8.1	1.8
CO ₂	—	37.0

Each cupel necessitates 1,579 pounds of the above mixture, which was moistened very slightly and passed through a No. 4 mesh screen.

The tamping is done by proceeding from the center in the form of a spiral. The circular indentations should overlap in part. At Aduana the tamping was done on a great number of layers.

The cupel, once in place, is heated very slowly, so as to avoid cracking, and towards the end, that is, after forty-eight hours, heated intensely and varnished with litharge, when it is ready for charge.

The sulphides of silver are incorporated in the lead bath with twice as much litharge. The base metal and foreign matter of the base bullion are carried away by the litharge and the skimmings. Some of the copper, however, remains until the last moment, and only comes out with the last litharge, which is very rich, and, as a rule, is revived and treated in the cupellation.

Two tuyeres furnish from a small ventilator the blast, at a pressure of 7 ounces per square inch.

The capacity of a cupel is 3,500 pounds. The duration of a cupel is forty days, if managed carefully.

Losses in silver	0.7 per cent.
Consumption of wood per 24 hours.....	\$7.50
Labor, per 24 hours	9.00
Cost of cupellation per ounce is.....	0.13

As the mint of Alamos accepted bars of silver with 985 fineness, we never tried to pass 992; the average though was 990.

Our monthly production in fine silver could be increased considerably since the construction of two more reverberatory furnaces was effected.

Mr. Dorion conceived the idea of the utilization of the bed of the river, which is dry most of the time, as a filter for all the waters coming from the reduction works. A mile from the reduction works a well was dug, and

the waters accumulated there. An electric pump pumped the water back, and thus the concentration could go on almost all the year without interruption. These two facts ought to increase the production considerably, if everything is managed skillfully.

During the year 1896, the cost of 1 ounce of fine silver can be stated as follows:

	Per Cent.
Cost in mining.....	\$0 391 or 36.0
Cost in milling.....	286 26.4
Cost in administrative expenses.....	075 6.9
Profit.....	333 30.7
	\$1 085 100.0

MINE TIMBER FRAMING MACHINE.

One of the most important items of expense in connection with mining is the proper timbering of the different workings, on account of the tremendous weights that are often imposed on the timbers. This work is usually done by hand, which is not only the most expensive way of doing it, on account

time and at the one setting. It is usually the practice to make the tenons of mine timber with a clearance of one-half inch to one inch between the ends of the tenons, depending on the shoulders and side grain of the sticks to sustain the weight. By so doing, the *best part of the log is not used for direct strain* endwise.

This machine enables the framer or timberman to make full use of the whole stick or log, by having the tenon cut to the proper length, to allow for the shoulders setting into the cross grain to a solid bearing, and then meeting, end to end; in this case leaving the tenon as large as possible, and bringing most of the weight to bear on the ends, thus relieving the shoulders of the great strain, and preventing the settling of the timbers, so often seen in the lower sets of large veins and chambers.

To describe the operation, logs are cut in lengths about one-half inch to one inch longer than they will be when finished in the frame. The saws being adjusted to cut the right size and length of tenon, the log or stick is rolled

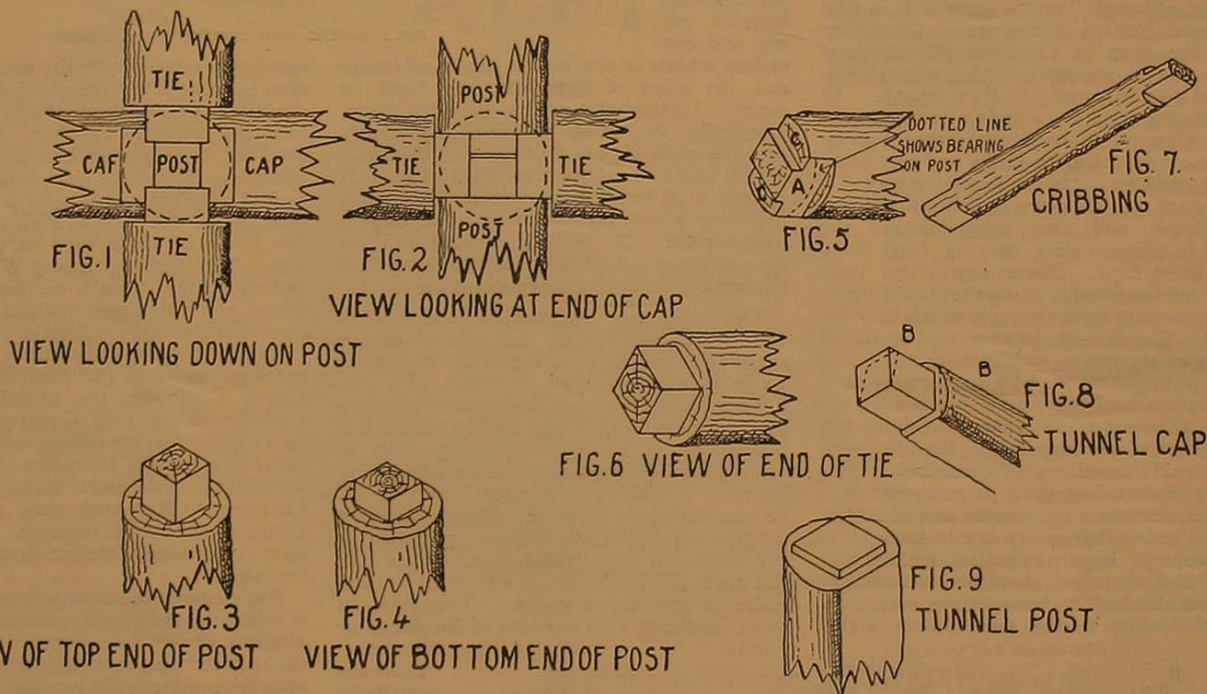
teen inches, the end cut-off saws twenty-six inches.

The saws are adjustable in every way. There are collars on the upright spindle to set between the two rip saws; also over and under them to cut any width of tenon. The shoulder cut-off saws are adjusted in a similar manner.

The whole design is neat, handy to adjust, easy to handle, is very strong and durable, does not get out of order, is self-contained and hence easy to set up, the several parts being carried on the main column or shaft, which is ten inches in diameter. The jacks or supports at the end of the stick frames are merely to prevent any vibration and give stability to the machine.

These machines are furnished complete with the line shaft pulleys, boxes and belts shown in the cuts.

When ordered, to accompany the framers, the necessary *wedge saw table and swing cut-off saw* for cutting the logs roughly to length, also *engine and boiler* to furnish power, are made. All necessary plans and other details are furnished. These machines are built to



of the large wages paid to mine carpenters, but is not by any means as satisfactory as having the framing done by machinery. The illustration presented herewith shows the character of work done by this machine. The framer can be operated by any ordinary mechanic, making the tenons equally true on round or square timbers, no matter how crooked they may be.

All sticks will be of equal length between the shoulders, and every tenon will be the same length. Should a round log be two or three inches larger at one end than the other, the tenon, nevertheless, will be exactly in the center. Any length of timber can be framed, from the shortest one needed, to ten feet between the shoulders, and from the smallest to sixteen inches in diameter or square, on the standard size machine. The size of the tenons on the standard machine can be varied from two to ten inches square, and from the shortest tenon to nine inches long.

By referring to the cut of machine, on page 23 it will be seen that there are ten saws, five at each end, so both ends are framed at the same

into position with the proper angular bolster under each end to bring it in the center, and made fast by the dogs shown, thus holding it firmly in position.

The attendant, by slowly turning the hand wheel, draws the log up to the first two cut-off saws for cutting the length of timber, (the shaft to which the hand wheel is fastened has pinions attached and these work in racks under each slide) then passes it steadily on through the two cut-off saws for cutting the shoulders. The stick is then carried on through the two split saws for cutting down to the shoulders, the block dropping to the floor. The attendant now racks the carriage back to the position shown, then pulls two taper catches just under the log, rolls the log over a quarter of a turn, the catches snap into place and the stick is in position for the final cut. It is then passed on through the saws as before, the whole operation taking but *two minutes* from the time of placing the timber in the machine until its removal. The two rip saws are twenty-four inches in diameter, the four shoulder cut-off saws six-

order, to cut any size, diameter or length, by the Denver Engineering Works Company, Denver, Colorado.

The latest catalogue issued by the Gates Iron Works of Chicago, Ill., Department 2, describing their mining machinery, is a general catalogue and handsomely gotten up. No doubt it is with pride that the Company presents this catalogue to the public. It is not intended for a technical affair; its purpose is to convey to the public an idea of their lines and the facilities they have. The separated catalogues issued by this Company take care of the details of the machinery manufactured and sold by them.

The Western Iron Works filed its articles of incorporation last week in Los Angeles, Cal. The directors are Frank S. Livingston, Arthur H. Ruggles, Cassius M. Smith, Frank P. Snow and W. W. Wood, all of this city. The capital stock is \$50,000, of which \$9500 has been subscribed.

THE EMERY WHEEL AND ITS MANUFACTURE.

The two abrasives which give the emery wheel its grinding and polishing qualities are emery and corundum. These two substances are practically the same abrasive, for the part of the emery that does the work is corundum. Emery is a mixture of corundum and the so-called oxide of iron, Mother Nature being the mixer. According to Prof. Dana, corundum has very little iron, while emery will average 46 per cent. of the oxide. Emery, therefore, has a very dark gray, almost black color, while corundum is a very light gray, with bluish and ruby colored tints. In almost any fair sized sample of corundum stone there are distinct traces of sapphire and ruby. Emery is mined in Turkey, in Asia, in the island of Naxos and in Chester, Mass. The Chester emery has a larger percentage of corundum than the foreign emery, containing 67 per cent. pure corundum.

Corundum is found in commercial quantities only in North and South Carolina and Georgia, although there is some of it in Alabama and Eastern Tennessee. Corundum being free from an excessive percentage of foreign matter, possesses much greater polishing and grinding qualities than emery. In the arts and sciences corundum is rated next to the diamond in hardness, emery coming next to corundum. Both emery and corundum are prepared for use in the following way.

They are crushed down to different degrees of hardness, and after being cleaned are graded in different sizes, ranging from No. 6 to the finest flour. These sizes take their name from the number of meshes to the linear inch of the wire cloth through which they are graded. The coarser sizes are used mostly in making emery and corundum wheels.

The principal reason why more emery than corundum is used is the difference in cost, the miners of emery ore in Turkey receiving but 6 or 7 cents per day, while the minimum wages paid to miners of corundum in this country is not less than 70 cents per day. Another reason for the greater cost of corundum is the fact that emery ore is brought to this country largely as ballast, and the cost to land it is, therefore, about one-twentieth of the cost attached to transporting corundum from the mines to the same points in this

country. This increased cost of transportation of corundum is due largely to the fact that the mines are located considerable distances from the lines of transportation, and even when delivered at the railroad the rail freight is more expensive than the ballast freight of sailing vessels.

The principal difference between emery and corundum wheels is that one is made of emery and the other of corundum, the bond or cement holding the grains together being practically the same in each. An emery wheel is made of such diameter and thickness as will best suit the work required of it. It is made of different degrees of hardness, some requiring a soft, some a medium and some a hard texture. It is also made of different sizes of emery, depending on whether or not the work to be done is coarse or fine.

The chief uses of emery and corundum wheels are to finish up and give a smooth surface to any iron, steel or metallic substance. Large quantities of them are used, as is well known, for gumming saws and grinding planer knives. One can readily understand that it would be practically impossible to name all the different purposes for which they are used. Their employment, however, can be summed up as follows: They are used for grinding, polishing, sharpening and shaping metal and wood substances. This does not cover all their uses, for wheels have been made for grinding feathers. They also do work similar to that required of the planer or the lathe.

There are practically three classes of emery and corundum wheels — vitrified, silicate or chemical and gum. Some users prefer one kind and some another. The vitrified wheel, of which there are the most in use, is burned in kilns as shown in Figure 3.

The sili-

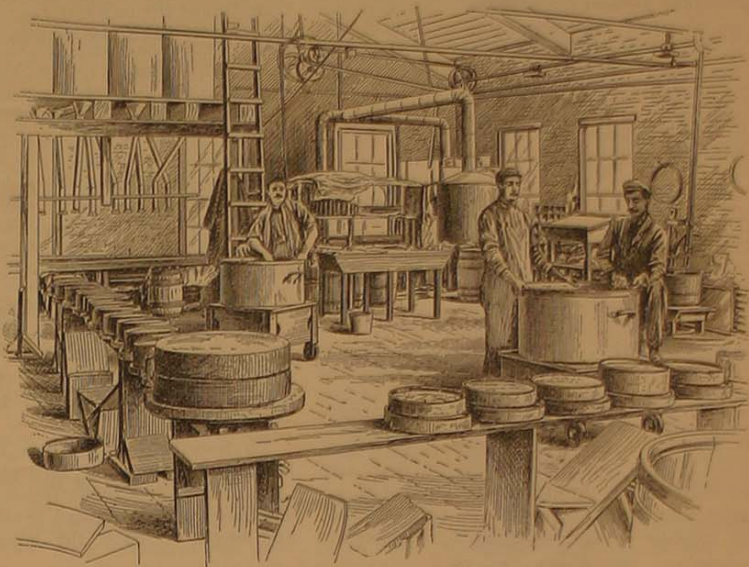


FIG. 1 MIXING AND CASTING DEPARTMENT.

cate comes next in quantity used. The difference between it and the vitrified consists principally in the difference of the bond used to hold the particles together, in that it is moulded and tamped into molds instead of being cast in just the sizes required, and then cooked or baked in ovens for a much shorter time and at not near as high a heat; also in that it can be made with or without a wire web. The Sterling Emery Wheel Mfg. Co. make both the straight vitrified and silicate wheel, and also a semi-vitrified wheel which combines the best qualities of the other two.

Referring to the illustrations of the principal departments of the plant of the Sterling Emery Wheel Mfg. Co., at Tiffin, Ohio, Fig. 1 shows the mixing department, the large tanks at the rear containing the different numbers of emery and corundum. A weighing appliance is underneath each, thus allowing the mixer to draw such sizes and quantities as are needed for the mixture. The wheels, after being mixed, are put in a dry room for one night.

Fig. 2 shows the next process room, which is called the shaving department, where the vitrified wheels are shaved down to nearly the required size, leaving just enough allowance for contraction in burning. The wheels are then placed in a large dry room, where they remain until thoroughly dry before being placed in the kilns, one of which is shown in the next illustration.

This engraving shows the kiln men placing the wheels in a kiln where they are subjected to a heat of between 2,500 and 3,000 degrees for about 72 hours, thus becoming thoroughly vitrified and one solid mass.

The next process is shown in Fig. 4, where the wheels are turned up and trued to exact size, after which they are tested at a speed giving them a working strain of more than double that at which they should be run when in actual use.

Fig. 5 shows the principal process in the manufacture of the Advance safety or silicate wheels. Here the men are at work tamping the mixture into molds. This, as will be readily understood, requires skill and experience on the part of the moulder, as he must get the mixture in equally and in such a way that the wheel will be of the same hardness through and through, and hence run and cut uniformly. In the center of this wheel a wire



FIG. 2. SHAVING DEPARTMENT.



FIG. 4. TURNING AND TRUING ROOM.

web is put when so desired. After the wheel is moulded to proper size it is baked in the ovens shown at the rear of the cut.

It is then taken to the turning department, Fig. 4, where it is trued up and tested by the same process as that of the vitrified wheel.

The wheels then pass to the shipping department. The works are so arranged that the raw materials come in at one end and proceed by regular stages to the other end, where the finished product is packed for shipment.

The Park & Lacy Company, who are agents for this company carry a large stock of emery wheels at their works, 51-23 Fremont street, San Francisco, Cal.

Changes in Mining Law.

The *Mining Reporter* of Denver very appropriately adduces the following as a remedy to our faulty mining law in the interest of greater development:

The present law is radically wrong in principle, if it be admitted that it should encourage development. There should never be a patent issued to a mining claim. An owner should have only a possessory title, and be fully protected in it only so long as he performed a stipulated amount of work each year. When he ceased to do that, it should revert to the government and be open to location.

Previous to 1872 there was no law requiring annual assessment work on mining claims. All were held under district and territorial laws, and these seldom required anything more than a record in the county or district recorder's office. As a result, the whole country was covered with claims which no one worked. When the law of 1872 went into effect these claims were open to location, and hundreds were located and developed into mines. More than half of the mines of Gilpin county were located under this law, and developed into producers. Without such they would still be idle prospects. The result was seen in the rapid increase of the state's production. It went at a jump from \$4,000,000

to \$5,193,845 in a year, very largely as a result of that law. Now the state, and all the West, is getting into the condition Colorado was then in. The country is being covered with patented claims, whose owners, often non-resident, let them lie idle year after year. In effect, though not intentionally, the law forces a dog in the manger policy. The owner will not develop or mine on them, nor can anyone else do so. The law is wrong, if the general and public good, through stimulation of mining, is one of its objects.

Estimating Tin in Tin Plate.

In a German method of estimating tin in tin plate, 25 grammes of the material are boiled for five minutes with 50 c. c. of 10 per cent. hydrochloric acid, and the liquid poured off into a 250 c. c. flask; the operation being repeated with fresh acids "two" to four times, until the iron is completely stripped. The solution does not need filtering, but is at once made up to the mark, and 50 c. c. treated with ammonia in a 100 c. c. flask till stannous hydrate begins to fall, when 10 c. c. of yellow ammonium sulphide are added, the whole shaken up, and filtered; 50 c. c. of the filtrate are diluted with water, all the tin sulphide thrown down by acetic acid, and after standing over night the precipitate is brought on to a filter by the aid of 10 per cent. ammonium acetate. As, owing to the certain absence of copper, ammonium instead of potassium sulphide is employed, the washing need only be very slight; in fact, 50 c. c. of the sulphide solution can be directly evaporated and ignited in a porcelain crucible, but the former method is said to be preferable. The precipitate is finally heated with fragments of ammonium carbonate until the ash is white.

The Jeffery Manufacturing Co., of Columbus, Ohio, have taken up the manufacture of the Columbian Separator-Screen and Bolter, and advise us that they have erected an experimental machine at their works for the testing of such material as may be sent them for that purpose. Parties interested in screening or separating cement, ores, etc., etc., can secure further data by addressing the manufacturers.

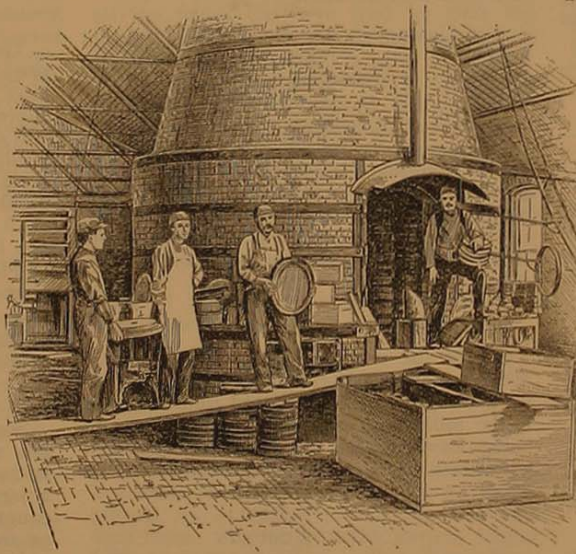


FIG. 3. KILN AND VITRIFYING DEPARTMENT.



FIG. 5. MOLDING ROOM, OVENS IN THE REAR.

CORRESPONDENCE

OREGON.

Mines of Malheur.

EDITOR JOURNAL:—Col. E. L. Bradley, the long-time resident of Malheur City, Malheur county, is one of his annual visits to Eastern Oregon's metropolis.

Col. Bradley speaks hopefully of mining in the district of Malheur, formerly known as El Dorado, in the early days of placer mining. He says several valuable quartz discoveries have recently been made on Quartz gulch in sight of the town of Malheur, principal of which are the Red Oxide, owned by John France and Chas. Morfitt; the Last Chance, owned by Bigelow & Boswell, and another claim owned by Dan Bruner. These properties are being developed and are showing well.

David and Robt. Worsham, who own another claim near by, have purchased a three-stamp mill, formerly located at Gold Hill, and it will be hauled to Malheur where it will be used for doing custom work for a time at least on ore from the several claims. Dan Bruner has agreed with the mill owners to furnish 100 tons from his mine and pay \$4 per ton for working. The Last Chance and Red Oxide owners are also getting out ore for immediate reduction. **

Miscellaneous Mining News.

ARIZONA.

La Fortuna Mining Company, of Yuma, Arizona, are putting in a 160-ton cyanide plant to work the immense pile of tailings which have accumulated during the two years in which the twenty stamp mill at that place has been reducing the rich Fortuna ores. The tailings, according to the most conservative estimates of the Fortuna Company's head men, will go from \$3 to \$5 per ton, and as by the cyanide process they can be worked very cheaply, it would seem that a rich harvest will be reaped from the very material which has paid for two years 10 per cent per month on the money invested by the stockholders of La Fortuna Company.

A Mill for Crown Point.

Mining men from Yavapai county say that Col. Brodie has made arrangements to place a ten-stamp mill, a steam hoist and other equipment upon the Crown Point mine in Castle Creek district. The development of this mine was accomplished with many interesting incidents. A number of strikes were made before 200 feet of work was done, and at the 300-foot level the ore chute presented two feet of a partially decomposed quartz which contained rich values in free gold. At this level drifts were run on the lead, and it was found that the rich ore continued as far as drifting was done. Then the war came and Col. Brodie ordered the pumps pulled out of the shaft, and he went off to Cuba. The Crown Point has since been idle. Every one who has seen the Crown Point predicts a bright future for the camp.

CALIFORNIA.

AMADOR COUNTY.

The scarcity of water in the Blue Lakes reservoirs has made it necessary for the Kennedy mine at Jackson to use steam, which it

is doing at the present time at both hoists. The Blue Lakes Company thought it would have plenty of water by this time, but the fact that this mine is using steam proves its mistake.

Sinking at the Zeila, near Jackson, is being continued. The ground encountered is hard slate, but is at the present time breaking very well, with the result that about two and one-half feet is made daily, and not a great deal of lagging is needed to secure it. Sinking operations commenced at 1160 feet and 150 feet have been sunk, and 100 feet more will be sunk before drifting or cross-cutting is commenced at the new depth. From fifteen to twenty stamps are operated daily, crushing from sixty to seventy tons of ore.—*Ledger*.

INYO COUNTY.

A prospecting tunnel, over 2000 feet in length, to develop water and gold placer ground in Mazourka Canyon, has been run by three or four local miners, with no other capital than grub, mining tools and energy. It is in all the pluckiest work that has ever been done in this county, and from last reports the indications are that the men will be rewarded with fortunes.

It is reported that N. S. Thompson has sold his Cuervo mine at Darwin to Hon. Pat Reddy for \$5000. The property lies between the two mines owned by Mr. Reddy known as the Defiance and Independence, and is located on the mineral zone which passes through the above mentioned properties. The Cuervo mine has a long tunnel tapping the lode deeper than the other two, through which all the ground can be worked at a small expense. In short, it will make low grade ores profitable.

MARIPOSA COUNTY.

Six of the new ore cars for the Merced Milling Company of Coulterville, to be used for hauling ore on the railroad from the mine to the mill, have arrived at Chinese, and are being forwarded to the mine. They weigh 3,500 each and are calculated to hold five tons of ore.

RIVERSIDE COUNTY.

A group of mines belonging to R. A. Tanner of Redlands, located about six miles from Riverside, in the Yucaipa country, is turning out well and may prove very valuable. The pay streak varies in width from two to six feet, and while specimens are very rich the ore will average about \$20 per ton. It is a cyaniding ore and Mr. Tanner expects to erect a plant for the reduction by cyanide.

SAN BERNARDINO COUNTY.

Three carloads of lumber and machinery lately arrived at Johannesburg, Cal., for the California Borax Co., that is erecting works at Borax Lake. They propose to erect a plant capable of turning out 100 tons of refined borax a month.—*Randsburg Miner*.

SAN DIEGO COUNTY.

Colorado capitalists are examining mining properties in the Julian-Banner district, and a number of deals of considerable magnitude are on the tapis. The names of the investing parties could not be secured, but it is intimated that they are prominent mining men from Boulder, Colorado, and vicinity. Northern California people are also interested.

TUOLUMNE COUNTY.

Around Sonora.

The Bawn mine, under Superintendent Wm. Rule, is looking exceedingly well under his skillful management. The shaft is down 300 feet and cutting out a station at No. 4. Judging from the waste dump, the formation looks favorable for gold, but naturally it will take considerable time to develop, as they have their several veins.

The Rawhide is down 1550 feet. The ore body looks as well as ever. All work at the 1550 foot level is stopped until the electric power plant is completed. Even the vast amount of sulphurets at the chlorination plant is cleaned up. Supt. Turner is doing general repairs.

The Arbona is sinking a shaft 300 feet in depth, which discloses 3 feet of solid quartz and several feet of vein matter. Mr. Dags-tazz is now in charge during the absence of Superintendent Sears.

Crosscutting at the Rappahannock is in progress at the 400 level. Everything works smoothly.—*Independent*.

COLORADO.

New Mill at Irwin.

The Willoughby Gold King Mining Company of Irwin, eight miles from Crested Butte, have let a contract to H. M. Fox & Co. of Florence to build a cyanide mill. The plant will consist of a building 24x160 feet, containing fifteen stamps, plates, tables, etc. The same parties have also taken a contract to build a large shaft house and ore bins. The shaft is 300 feet deep and will be put down 200 feet deeper. Fox & Co. are well known in Florence as extensive contractors, having done a large portion of the work on the American Reduction Company's mill, besides bridge building and other public improvements.

A Placer Deal.

Something a little out of the ordinary in the way of mining deals was consummated last week when a good interest was secured in a large tract of placer territory in Routt county, Colorado. The placer ground covers an area of over 1,000 acres and the best part of it is located in an old river bed now forming a gulch of about half a mile in width. While the developments on the property are so far merely of a prospective nature, some very encouraging returns have been received on large samples of gravel and black sand. Tests on the gravel show values ranging from 80 cents to about \$1.50 per cubic yard, while the black sand runs all the way from \$400 to \$500 per ton.

Prospectors have lately been sent out to the ground to do further work, and make further tests, and should the results prove as favorable as was the case in the former batch of samples, it is more than likely that a company will be started to thoroughly develop and work the properties in the coming spring. A number of local people are interested in this placer, but the whole thing is now under option to Mr. John Morton, of Pueblo, Judge Alfred Bartow and Claude Sachs of Colorado Springs, also have personal holdings.

Portland Steel-Cased Shaft.

"Why not case the shaft with steel instead of wood?" is the question asked by a great many now, since the matter has been called to their attention. There is no reason why,

and the Portland will probably be the first to adopt this method of casing the shaft. Plans and specifications have been submitted to the Portland people, and the cost being less, and the structure more durable, than wood, justifies the management in adopting the plan. The saving in excavation will be considerable, estimated at about a yard and a half of rock in a three-compartment shaft.

IDAHO.

Interesting happenings are taking place thick and fast lately down among the mining cabins in the Marshall Lake neighborhood in Kootenai county. The Comstock, one of the first and most promising properties there, is now named the Creedor by another company. If it isn't Creedor it is Comstock and the courts at some future day are to determine which to call it. It is much to be regretted that such a valuable property should become entangled in the meshes of the law. But, come what will, the Comstock or Creedor—name it as you please—is so valuable that it is quite evident that many thousands of dollars are sure to be expended in the process of settling the question of its rightful ownership. The Creedor men have had possession of it for some time, but not long ago the Comstock men got possession in some way and barred the tunnel with a strong door and strong locks. They felt pleased about their success for the time being, but to their amazement, the other day, the Creedor men came along like Yankee battle ships after a Spanish fleet, and the strong door and strong locks were quickly disposed of. The next thing will be something else.

MICHIGAN

President Fay of the Centennial Mining Co. has returned from his fifth visit to the property this year, says the *Hancock Copper Journal*, and speaks very favorably of the developments to date on the Osceola amygdaloid. He says: "Sentiment at the lake is now very well disposed towards Centennial, and with good reasons therefor. The purchase of the forty acres of land from the St. Mary's Co., enabling Centennial to sink a shaft on the outcrop of the Kearsarge lode, together with the purchase for \$37,500 of the 225 acres on Torch Lake for a new mill site, settles, I believe, the future of our property. We have in this latter purchase secured three-quarters of a mile water front on the lake, with unlimited sand room; the land is located directly opposite the Calumet & Hecla stamp mill. On Torch lake are also located the stamp mills of Calumet & Hecla, Tamarack, Osceola and Quincy companies.

Copper Products.

The Wolverine mine reports a product of 218 tons and 600 pounds for October.

During October the Quincy mine made 875 tons and 275 pounds of copper.

The Atlantic mine reports 263 tons and 1470 pounds as product for October.

MINNESOTA.

There are still 289,668 tons of iron ore to be forwarded from the head of the lakes and Two Harbors before the close of navigation and this amount will be shipped provided the weather in the meantime does not turn cold

enough to freeze the ore so hard that it cannot be handled. The Duluth & Iron Range road desires to ship at least 194,668 tons during this month. The Duluth, Mesaba & Northern wishes to ship 75,000 tons and the Eastern Minnesota dock on Allouez bay wishes to ship 20,000 tons more during the season. If these amounts are shipped, and they will be unless the close of navigation should be uncommonly early, the aggregate increase of iron ore shipments from the head of the lakes and Two Harbors for the season over those of last season will be 227,837 tons. The total shipments for the season will be 5,787,000 tons as compared with 5,559,163 tons for 1897.

MISSOURI.

Joplin Budget.

The Owl at Belleville is shut down temporarily to put in additional machinery. Their shaft is down 133 feet and good ore in the bottom.

All the mines on the Leddy lease at Central City are in full operation, viz., Ruhl Bros., Buckeye, Golden Slippers, Elegant, Grand Central and Holmes.

A rich strike of lead and jack is reported on the South Carthage land by Dick McCorkle on lot 18. Lead was struck at 62½ feet and jack at 70 feet.

The Dick Wright Mining Co., on the Webb land, south of Shoal creek, struck a body of lead with a drill at 42 feet, which continued on down to 105 feet.

The value of the weekly output of ores for the week ending Oct. 29 was one hundred thousand dollars more than it was for the same week last year.

The Mt. Vernon Mining Co. have sold their plant at Stotts City to the Southwest company of Chicago, and sub-leased them five acres upon which it is located.—*Herald*.

MONTANA.

Gold East of Old Beartown.

It has been suspected that gold ore existed in the vast sedimentary regions east of Old Beartown, in Missoula county, but up to the present no extensive prospecting has been done there. Recently C. W. Patten, former foreman on the Flathead Indian reservation, decided to do a little prospecting in that vicinity and has made what he claims is a remarkable discovery of valuable gold and copper-bearing quartz. The present meagre development shows a well-defined fissure about four feet in width, traversing a quartzite formation. The foot wall is a dark, fine-grained quartz, while the hanging wall is quartzite of a coarse light gray color. The gangue matter is a dark, fine-grained soft gray mineralized rock having a slaty structure. Fine specimens of gold ore are found on the foot wall. Mr. Patten, who has made mining a life study, is of the opinion that the gray matter in the fissure is only the capping of a valuable ore body that will be found lower down, and will shortly start a tunnel to tap the fissure at a depth of 200 feet. If this new discovery of Mr. Patten's proves to be of the value that the present showing would indicate, it broadens by 10 miles the wonderful ore-bearing horizon of the Garnet district, and will also prove in a large degree that this region is as yet barely prospected on the surface, and that in days to come good paying ore bodies will be found in the most unlikely places.—*Helena Independent*.

NEVADA.

Another Rich Discovery.

From Sheriff McGregor, who spent last week in Austin, we learn that a ledge, 68 feet wide and averaging \$14 per ton clean through has been cut in the Drinkwater Tunnel, at Silver Peak. Mr. McGregor, who was at the property one day last week, says it is the biggest thing he ever saw and that there are 400 feet of backs, all new ground.

The property belongs to Mr. Blair, of New York, and is being worked for that gentleman by Sam Wasson.

Silver Peak will one of these days be the largest mining camp on this coast. The ore is gold.—*Reese River Reville*.

The Austin Mining Co. of Austin has sold all the old iron and machinery on Lander Hill belonging to the Company, to a Sacramento firm, and the same is now being gathered up ready for shipment.

The Comstock Tunnel Company has been officially notified by the Comstock Pumping Association to have the Sutor tunnel in readiness for conveying the water from the flooded levels of the Comstock mine in sixty days. Some repairs will have to be made to the covered drain boxes in the main tunnel and the north lateral branch leading to the C. and C. shaft.

NEW MEXICO.

The Mills Tunnel Company at Elizabethtown has a good showing in the New Moon shaft, just finished, at the depth of 175 feet. They are in solid ore, neither wall having been found. A contract is let to Thos. Puliam to drift 20 feet in either direction, making 40 feet, in the hope of finding the walls. The company has also let a contract to John Doyle, to sink another shaft, 150 feet, elsewhere on their property. This company is composed of the kind of men who know a good thing when they see it. The company will continue work during the winter.—*New Mexican Miner*.

Output of Hillsboro gold mines for the week ending Thursday, Nov. 17th, 1898, as reported for *The Advocate*:

	TONS
Wicks.....	35
K. K.....	30
Richmond.....	55
Snake Group.....	80
Opportunity.....	30
Sherman.....	5
Cincinnati.....	25
Trippe.....	85
Rex (silver-lead).....	15
Total.....	360

Total output since January 1, 1898—8,430.

A. E. Dawson has resigned the superintendency of the Hearst mining interests at Santa Rita, Grant county, and Lewis G. Stevenson has been appointed to the position. Mr. Stevenson is a son of Adlai Stevenson, ex-vice-president of the United States. The gentleman has been employed for some time as an assistant manager of the mines of the company at Pinos Altos, and has devoted himself to the study of the mining industry. He will, without doubt, make these great mines as successful in the future as they have been in the past. The force of miners employed will be increased immediately and the

work of developing these wonderful ore bodies will be pushed as rapidly as consistent with economical working. The ore extracted is shipped to the Silver City Reduction Works.

OHIO.

Gold in Ohio.

Another discovery of gold has been made in the Malvern district, near Canadover. The latest find is at Augusta, fourteen miles north of Malvern, which H. O. Lyda has discovered on his farm. The ore, it is claimed, is richer than the Malvern product. A large number of people visited the new find, and many express the conviction that Lyda has struck a good thing. Specimens will be assayed at once. The discovery of gold has caused the price of land to make a fabulous jump, so that now it cannot be bought or leased.

OREGON.

Operations continue at the Collateral and Virtue mines under favorable conditions.

The report is again current that the French Flagstaff Mining Company will resume operations in a few days.

Dr. C. G. Wheeler is developing one or more locations in the vicinity of the Red Boy, having secured an option of purchase in the interest of eastern capital.

Several carloads of machinery for the E. & E. mines at Bourne, Dennis Searles, manager, is en route, and on arrival will be put in place at once.

The Badger Mining Company at Susanville is making daily shipments to the Baker City Sampling Works. There is now en route and expected to arrive shortly five tons that will yield from \$200 to \$500 to the ton.—*Baker City Democrat*

SOUTH DAKOTA.

The Garden City Cyanide plant has been making its test run this week. The result will be known next week. There is but little doubt as to its success.

The Morrow leasers of Union Hill are steadily at work taking out ore and shipping it to the D. and D. Just at present they are putting in an upraise and are working all their crew, but will have an increased force employed within a few days. The grade of ore is increasing, as an assay of last week gave \$91 per ton.

The lessees of the Cherry Lode claims which are located southwest of the Ben Hur claim, in Nevada Gulch, are expecting to strike the Ben Hur shoot of ore most any time. It is figured that this shoot of ore, which is proving to be of good size and value in the Ben Hur property, crosses the Cherry Lode. The property is leased to Messrs. Frank Shannon and S. E. Oens of Terry and Wm. Barker and D. C. Boley of Deadwood. The first two lessees found that they were unable to sink the shaft deeper without machinery to handle the water. They consequently offered an interest in the lease to the two latter gentlemen for the machinery needed. A new cage was put in the hoist last week and it worked successfully. The shaft is now down 130 feet and two drifts are being

run east and west. The bottom of the shaft assayed from \$5.70 to \$12 and it was a question at first which would be the best way to run a drift. Strings of ore of small size are being encountered frequently and it is thought that the main shoot of ore is not far distant.—*Black Hills Mining Review.*

UTAH.

The Bullion-Beck property at Eureka is looking very well and the regular dividend of \$10,000 was paid on Nov. 15th.

The Daisy Company of Mercur continues the shipment of cyanides into Salt Lake City. Stockholders will receive their first dividend about Christmas eve.

Work at the Eagle and Blue Bell of Eureka is progressing finely.

Galena's properties at Fish Springs are in good shape and the announcement of the uncovering of some high-grade ore has been made.

Four Aces property at Silver City is sending in some first-class ore to Salt Lake City. The new machinery is upon the ground and work in the ore body recently encountered will be pushed most energetically.

The Joe Bowers Company of Tintic report the discovery of two feet of high grade galena ore.

The Mercur Company is putting through a better grade of ore than for months past.

An eastern syndicate has had experts examining the property of the Sacramento Company at Mercur with the intention of securing control of the stock if the ore bodies prove of sufficient value.

Utah Company of Fish Springs is sending in some very high-grade ore and in probabilities will start the new year in a most gratifying manner.

WASHINGTON.

The Okanogan Free Gold Mines Co. has ordered a 10-stamp mill and cyaniding plant. A concentrator will also be put up to treat a deposit of platinum found on the company's property, which is a separate deposit from the gold veins.

Reports from Sheridan camp, north of Republic, are of the brightest. Night and day shifts are working on several properties. The Zella M., at the bottom of a 70-foot shaft, has a 4-foot chute of solid ore and it is claimed nearly a third of it shows a pay streak of \$500 ore. The vein is 80 feet wide, but the rich ore chute averages about four feet.

Values in the 60-foot shaft on the Golden Harvest, Republic camp, run from \$6 to \$54 from top to bottom, the greater values being at the bottom. A tunnel gives a depth of 150 feet, showing ore for over 300 feet in length. When the size of the ore body is determined an upraise will be made to the shaft. A lower tunnel will also be driven to give a depth of about 450 ft.—*Miner and Electrician.*

FOREIGN MINING NEWS

BRITISH COLUMBIA.

The 12,445 tons of ore shipped from the Le Roi last month cost \$4.47½ per ton to mine, including the necessary dead work, the advance development and the hoisting of the waste. The output for November will probably reach 14,000 tons.

J. B. Hastings of the War Eagle figures out

the relative cost of hand drilling and machine drilling, everything taken into account, as being respectively \$35 and \$17.50 per foot. In stopping the machine performs for \$2.50 per ton what costs by hand work \$7.50.

The Silver Bell, Consolidated, has elected the following officers: William Thorburn of Almonte, Ont., president; J. A. Currie, of Toronto, first vice-president; A. G. Hector, of Toronto, second vice-president; and Hermann Kitley, of Toronto, secretary-treasurer.

Golden Cache.

Mr. J. M. Mackinnon has resigned the presidency of the Golden Cache Company. This step was taken on account of troubles which have arisen between Mr. Skene, vice president of the company, who is understood to represent the Oldroid holdings, which are practically a controlling interest in the company. A special meeting of the company was held in Vancouver, Nov. 16th.—*B. C. Critic.*

LOWER CALIFORNIA.

Harry Howard has interested New York capitalists in the Cedros Island mines, which he has leased of the Cedros Island Mining Company, and they left San Pedro last week with a yacht and crew and supplies to inspect the mines and arrange for extensive development. They tried to obtain a vessel here, but the only one suitable, the San Diego, was not to be obtained for the trip, and as a result they returned to San Pedro.

MEXICO.

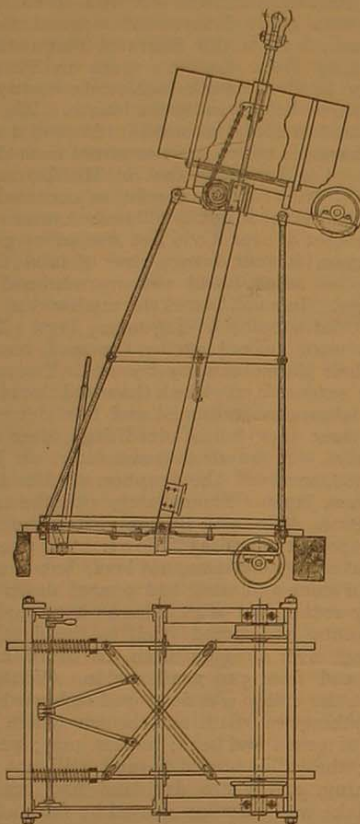
Alexander Shepherd's company, at Batopilas, is now working 48 mines and has 1,200 men employed, says *Modern Mexico*. The company is making many improvements in its properties, the principal one being the driving of the Porfirio Diaz tunnel which penetrates 6,600 feet into the mountain.

The total value of mineral products that passed through the custom houses of the Republic during the last fiscal year of 1897-98 was \$91,250,000, showing an increase of \$10,500,000 over the previous year. Of this the amount of silver is stated to be \$67,000,000; gold, \$16,000,000; copper, \$4,700,000, and lead, \$3,000,000—all reckoned in Mexican silver.

The Quebradilla mine in the state of Zacatecas, from which the old mine-owner, Don Joseph de la Borde, or Borda, after having been ruined by other mines, took in five years £20,000,000 worth of treasure, is again in a fair way of producing a large quantity of good ore, the drainage works being about completed.

GENERAL NEWS.

Advertising in Some of its Phases, is the name of a booklet containing the address of Frank A. Munsey, before the Sphinx Club, at the Waldorf-Astoria, New York, October 12th. Mr. Munsey's address is full of good practical and original ideas, well written and forms, what old Solon Chase gave his newspaper, *Chase's Chronicle*, for a subheading—"Good Easy Reading." The above mentioned pamphlet is a fair sample of the unexcelled writing of that famous journalist.



GRAY'S CAGE CHAIR.

Gray's Cage Chairs.

These chairs, which have been placed in the Hope, Leiter and other mines, are adapted either for vertical or inclined shafts. The illustration shows them as used for an inclined shaft.

The improvement over ordinary usage consists in having one set of chairs attached to the cage instead of a set of chairs for each shaft level. The chairs are thrown out by means of a lever so as to rest upon wall plates at the several levels, and when the lever is out of operation, springs draw in the cages so as to clear the wall-plates.

These chairs are not only economical, substituting one set of mechanism for many, but furnish the convenience and security of operation from the cage. They are the patented invention of Mr. Alexander Gray, Butte, Montana, and are manufactured and sold by Fraser & Chalmers, Chicago, Illinois.

The Jones Hand Rock Drill.

For years, every one engaged in mining, prospecting, quarrying, tunneling, etc., has felt the lack of a perfect hand drill for hard rock. The Jones Hand Rock Drill is just such a machine—one that is strong, durable, reliable, simple, light, easily handled, and operated by one man, and surprisingly cheap; one that will, under all conditions and circumstances, reduce the cost of rock drilling at least fifty per cent. In itself it combines all the requisites of a perfect drill.

Its construction is simple. It is small and compact, yet arranged on mechanical principles, always keeping primarily in view the work to be done. The shell or frame is a special tough bronze casting, and the other wearing parts are made of the best tool steel.

A man operating this drill can be assured beforehand that he is handling a machine made of the strongest and toughest metals that could be used in its construction. It does not require experience to operate this machine; any average miner can succeed with it from the first.

In its internal construction, the Jones Hand Rock Drill contains but five parts, only four of which are working or moving parts; and of these, only two, (the hammer and the spring), are subject to violent motion. Owing to the simplicity of construction, and especially of its moving parts, this drill has proved its economy in the matter of repairs. All parts are made interchangeable. Duplicates for repairs can be furnished promptly, and any man of ordinary intelligence can replace any part without assistance from an expert or even a mechanic.

This drill unmounted weighs about 75 pounds, and can be easily handled by one man, both in setting up and in changing angles. The column weighs about 45 lbs., so that drill and column weigh about 120 lbs. complete.

The drill can be operated successfully in any place or position that the old-fashioned drill hammer can be used. The telescope column enables a man to set it up and have it working in one minute. The length of the shell is twenty-six inches by three and a half inches in diameter.

The Jones Hand Rock Drill will strike an uncushioned blow of any desired force, being so arranged that, with the springs furnished with every drill, any desired blow from sixty to two hundred pounds can be delivered, and heavier blows will result from the use of extra strong springs. The power required is only 10 per cent of the blow delivered.

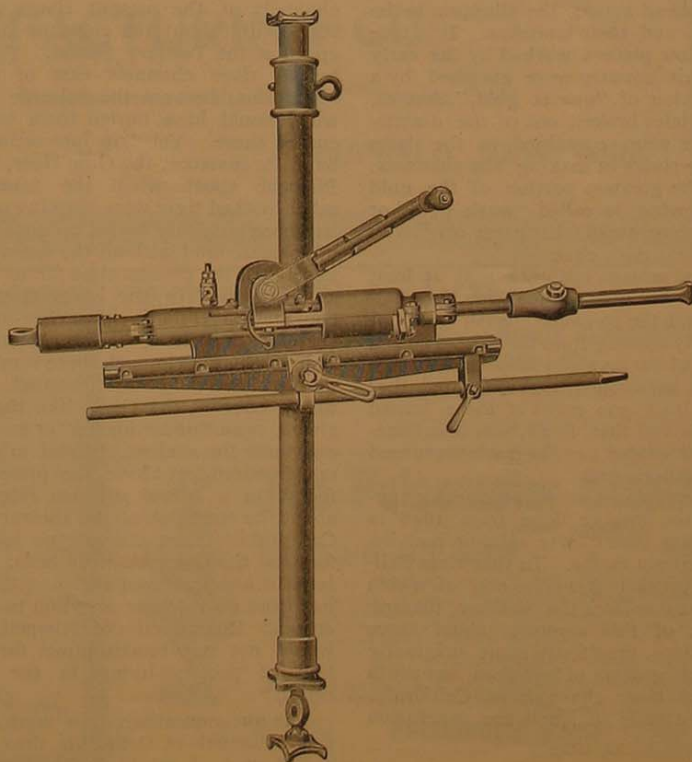
The springs are readily adjustable to any desired force, without even removing the bit from its place in the hole. This is accomplished by a simple but ingenious device for controlling the tension of the spring, explained in the directions for operating, and does not require a second's time or any previous experience whatever.

Its simplicity of construction, self-regulating feed and high elasticity of stroke force assures against any danger whatever from the sudden removal of resistance. This machine will penetrate a stratified rock of varying hardness as surely as a solid one.

This drill possesses the advantages of a rotary drill, the bit revolving one full circle in every twenty-two strokes. The rotary motion of the drill must take place automatically, and being locked each time as it strikes the rock by our very simple and effective turning device, it is the only machine, hand or power, that can effectually use the single bitted drill, and make true, round holes; the drill when it strikes the rock is compelled to cut or chip where it strikes, as it is locked firmly and can neither turn forward or back, consequently, leaves no figure holes. This turning device is simple, and very strong.

The Jones Hand Rock Drill is believed to possess the only perfect self-feed ever invented. It is certainly the only one upon the market. Few other drills will accomplish anything in this line in down holes, but the Jones Drill will feed automatically at any possible angle of its sphere. Its feed is perfect, and adjusts itself automatically to hard, soft or stratified rock. If it cuts nothing, it feeds nothing; if it cuts an inch, it feeds the inch; if it cuts an eighth of an inch, it feeds the eighth of an inch. The Jones Drill is the only machine in the market—hand or power—with elastic buffers or bumpers that fully and effectually break the rebounding or recoil blow, the recoil blow itself being used as a feed agent or factor. Thus it is relieved of the jar that would come from a screw or worm feed, and otherwise break, rack and strain machine, the jar itself being utilized.

For complete catalogue, giving instructions for working and other information, address The Edward P. Allis Co., Milwaukee, Wis.



JONES' HAND ROCK DRILL, ON COLUMN.

THE BURIED RIVERS OF CALIFORNIA AS A SOURCE OF GOLD*

[By J. R. Seapham, San Francisco, Cal.]

The increasing demand for gold to carry on the commercial transactions of the world, makes all the great sources of that metal objects of special interest at the present time. The idea called up by gold mining has grown to be the thought associated with the extraction and crushing of quartz derived from veins of rock in place. Most gold mines of today probably are mines of this character. Yet it is well known that the sources of gold are by no means limited to the quartz veins, and we have reason to doubt that, in this country at least, in the immediate future this will be the most productive source.

One source of gold, the importance of which has gradually been dawning upon the minds of the mining community here, is the vast accumulations that lie in the buried rivers of California. These ancient river channels, buried under a mass of superincumbent mass of volcanic material, are perhaps peculiar to California. They occupy the western slope of the Sierra Nevada, from about the northern line of Plumas county to the southern line of Tuolumne county in this State, a distance of about 150 miles in length north and south, and from the lowest foothills on the borders of the Sacramento valley to near the summit of the mountains, a distance of 50 miles in breadth from east to west, in all an area of about 7,500 square miles. Throughout all this region, many of the highest ridges are capped with masses of volcanic material, hundreds of feet in thickness and buried under these "lava caps," as they are called, are the ancient river channels I refer to.

The shallow placers, discovered by Marshall in 1848, and worked by the argonauts in the pioneer days of California, were formed chiefly from the detritus of these ancient channels, where they had been cut across by the modern rivers and their contents of gravel and gold scattered among the alluvium in the modern rivers and their branches. It is true that the shallow placers worked by the early miners in this country were enriched by a small proportion of "quartz gold," that is, dust and particles broken out of the disintegrated quartz veins contained in the slates eroded by the rivers in making the channels; but by far the greatest portion of the gold obtained was what is called "wash gold" or nuggets, large or small, that came originally from the ancient river channels.

Experienced miners estimate that at least 85 per cent. of the gold gained from the shallow placers was the so-called "wash gold" or gold originally coming from the buried rivers.

From careful surveys and inspection of the region before mentioned, it is estimated that there are at least 300 miles of these buried river channels and that, in all, less than one-ninth has been eroded and the contents turned into the modern rivers.

The shallow places were practically exhausted by the mining done from 1848 to 1856. By that time quartz mining had become an important factor. In that time California had yielded \$429,000,000, of which \$354,000,000 came from the shallow placers; 85 per cent. of this amount, about three hundred millions, manifestly came originally from the disintegration of less than one-ninth of the buried river channels of California. From this estimate we reach the conclusion

that more than \$2,500,000,000 of gold, less what has since been extracted by drift mining, now lies in these ancient river channels of California, practically above the surface of the ground. Since 1856 and up to the present time about \$90,000,000 in gold have been gained from these ancient channels by the various drift mines, and the estimated contents should be diminished by this amount. But we have another means of estimating the gold contents of these ancient channels, namely, the practical experience of the miners who have pierced the ridges with tunnels or shafts and extracted the gravel from the various channels, thus cleaning up their entire contents, in some cases for as much as 4,000 feet of their length. This experience shows a value in the regular mining operations, varying from \$156 per foot in the least productive to \$2,620 per foot in the richest channels, so that in some regions, as on the Forest Hill Divide, it has come to be accepted as a rough estimate that the channels will produce a thousand dollars to the lineal foot. By this estimate, based on experience, we arrive at the conclusion that the buried channels in the region of California mentioned contain \$1,584,000,000, practically above the surface of the ground. This estimate, based on experience in mining channels, is only three-fifths of the amount estimated on the first basis mentioned.

This statement of the large amount of gold within the fair reach of the adventurous miner, will justify some explanation of what the buried rivers of California really are.

The buried rivers are sometimes called "dead rivers," but they are no such things. A river is one of the most persistent things in nature. It cannot be stopped or destroyed without changing the whole topography of a region, and as the topography of California has been substantially in its present form for more than two geological periods, the rivers have flowed substantially in their present courses during that lapse of time, so that what we are considering are really the buried channels of the present rivers which were sealed up about the close of the Pliocene epoch of the Tertiary period. There are no buried river channels east of the Rocky mountains, because the volcanic phenomena which could have buried them have not occurred there. Yet how interesting it would be if, for instance, the Ohio river, during the Pliocene epoch when the mammoth and saber-toothed tiger were roaming on its banks, had been suddenly sealed up under a coating of volcanic mud with all the fauna and plants kept until the present time for us to dig out and explore. In the lower stretches of its course, the Ohio is an "over-loaded," and therefore depositing stream. Hence the altitude of the old channel there would, perhaps, not be above the present channel. But, in its upper courses, the Ohio, like the California rivers, is an "under-loaded" or eroding stream and there the ancient channel might be several hundred feet above the present bed and found in a lateral adjacent ridge. This is about the condition of the ancient channels in California. Thus the volcano has preserved for us the ancient river beds, as in other lands it has preserved ancient cities. If there had been no volcanic eruption to seal up the ancient Roman city of Pompeii, that place would not now remain intact for the inspection of people living in the nineteenth century.

The question arises, how were the ancient river channels of California thus buried and sealed up? I might say briefly, that they

were filled by successive outflows of volcanic mud from great fissure vents, opened along the main axis of the Sierra in that portion extending from Lassen's peak in Plumas county to Castle peak in Nevada county, a distance of over 40 miles in length. We are permitted to study volcanic outflows of a similar character which have occurred in modern times. I will instance that of Mt. Asama in Japan. The eruption I refer to occurred in 1783, and is described as follows: Asama rises to a height of over 8,000 feet and in its great paroxysm it sent down a river of mud from five to ten miles broad and overwhelmed 42 villages. In some places the mud was so hot that it did not stop boiling for 24 days. Two rivers were sucked up by the mud torrent and their places taken by dry rock. The noise of the explosion was like a thousand thunders. The lakes were poisoned and fish sickened. The river was full of dead dogs, deer and monkeys. A hundred years later, on July 15, 1888, occurred the eruption of Mt. Bandaisan in Japan. Immediately after the eruption Prof. Milne and Burton visited the spot and reported on it as follows: "A river of 'moya' or agglomerate, not lava, but a mixture of stone and mud, had poured down the valley at the rate of 48 miles an hour and in 20 minutes had spread itself to the depth of 100 feet over a region from 12 to 15 miles long and from 5 to 7 miles wide. Whatever was in the valley was destroyed or buried up. Everything was bare and brown where carpets of green had been; houses gone; people gone; the valley buried in mud still hot and steaming, and where dry land had been, a new lake was forming, caused by the sudden damming of the stream." This eruption of Bandaisan, as described by these reliable living observers, represents on a small scale what occurred in California on a tremendous scale some time about the close of the Tertiary period. The final outflow of each successive eruption was probably of hotter and stiffer material which quickly dried on the surface and formed a hardened crust that resisted the action of water. Hence, the river when it gathered its waters together again, had to erode for itself a new channel on one side or the other of the lava-filled valley. Generally the lava flow would form higher in the center than at its edges and the river would divide and form two streams, one on either side of the lava flow, and in the course of the hundreds of thousands of years that have elapsed, these streams have cut down their new channels, eroding canyons sometimes two or three thousand feet in depth, leaving the ancient channel high up in the heart and near the top of a ridge which separates the forks of the modern stream.

The courses of the modern rivers are not exactly parallel to the ancient channels, although they are approximately so. The ridges carrying the ancient channels have been in some places eroded by glaciers and in some places have been cut through by the modern rivers. In this way the rivers of today have received the principal portion of their auriferous contents.

The canyons or valleys through which the ancient rivers flowed were much less deep and precipitous than the canyons of the modern rivers. Yet the ancient streams were certainly much larger than the modern rivers. Their channels are several times as wide; as exposed in mining operations, the ancient channels show a width in some places of from 2,000 to 4,000 feet, which is many times the width of the corresponding modern river.

The great depths of the modern river can-

*Mines and Metallurgy.

yons make it certain that the modern river has disintegrated a much greater amount of quartz veinstone than was done in forming the ancient river channels. Yet we find in the modern river channels but a small portion of quartz gold or gold derived from recent disintegration. If it were not for the nugget gold, their sands would nowhere have been found particularly rich. How then can we account for the presence of gold in such large quantities and in the nugget form in these ancient channels?

Experience has proved that all channels buried in the volcanic material, if they contain bedrock gravel, have in them somewhere a "pay lead" carrying gold. Sometimes there are two or three channels, each one at a considerable height above the other, in the same volcanic flow and between the same rim-rocks. These channels, of course, are formed at different periods of the stream's history, the upper channels each having the volcanic material itself for its bed. When such is the case, if these upper channels carry bedrock gravel, they are also sure to carry a charge of gold nuggets. The interval between the formation of these several channels, although doubtless a great many years, must have been as nothing compared to the long interval of time required to form the deep canyons where flow the modern rivers, and it is absurd to think for a moment that the gold contained in the ancient channels could have been eroded from the rocks, especially from the volcanic material, in the brief period during which the ancient rivers were forming these sec-

ondary channels. Some other explanation of the presence of this gold is forced upon us. We should look for an explanation that will be general in its nature and account for all gold found in similar situations everywhere. Such an explanation has already been pointed out by several scientists, although it is not yet generally accepted.

(To be Continued.)

PERSONAL NEWS ITEMS

J. H. SCHENK of the North Star group of mines in the Penobscot district in the Black Hills of South Dakota has just returned to Deadwood from Omaha, whither he went to perfect arrangements for further developing his properties.

WYNDHAM WYNNE of London, England, one of the managers of the Snowshoe mine at Libby, Montana, spent several days at the mine last week, and will return to England shortly.

H. E. CROASDALE, business manager of the Hall Mines Co., of Nelson, B. C., recently left for England, where he will recuperate for awhile.

G. L. BUFF has withdrawn from the co-partnership of the late firm of BUFF & BERGER. C. L. BERGER has associated with himself his two sons, W. A. and L. H. BERGER, under the name of C. L. BERGER & SONS, who will continue the manufacture of the same high grade mathematical and astronomical instruments in all their branches, and their highest aim will be to merit and advance the very flattering record that has been awarded their past productions.

NELSON G. DOUGLASS, the Mining Engineer of Los Angeles, Cal., has recently left for New York on an important mining deal.

C. E. LOOCE, the genial manager of the Grand Central mines at Mammoth, Utah, has been spending several days in San Francisco, Cal.

W. F. KANE, the assayer for the Republic mine at Republic Camp, Wash., has just left San Francisco, Cal., for Spokane, Wash.

F. W. DENTON, professor of mining at the Minnesota College of Mines, has been appointed superintendent of the Winona mine, Houghton, Michigan. PROF. DENTON is a graduate of Columbia. His appointment takes effect Dec. 1st.

At a recent meeting of the San Francisco Co. California Miners' Association JULIAN SONNTAG was elected president and CHAS. G. YALE, secretary. JULIAN SONNTAG is the secretary of the California State Miners' Association, J. H. NEFF, president; T. J. PARSONS, vice president and S. J. HENDY is the treasurer.

S. C. HORNBRUCK, the Toledo, O., mining expert, has recently left Denver, Col., for Wyoming, where he will investigate some copper properties.

BYRON N. WHITE of Spokane, Wash., is in Ashland, Oregon, on important mining business.

F. M. JEFFREY of Cripple Creek, Colo., the mining lawyer who located in Los Angeles, Cal., some time ago to practice his profession, has since opened an office in the Mohawk Block, Spokane, Washington.

W. H. KEARNEY, who has been examining the Climax Group at Salmon Siding in Oregon, has gone on a trip to Portland, Oregon, to make some examination near that city.

LEW. E. AUBURY, the assayer of Los Angeles, Cal., has returned from an extensive examination of mining property in Ventura county, Cal.

Thomas D. West has suggested a plan to establish a national agency for standardized iron drillings, which was endorsed by the American Foundrymen's Association June 8th, 1898, in session at Cincinnati, Ohio. There is need of greater uniformity in pig iron analysis when making a large standardized casting.

R. A. F. PERROSE, the well-known mining man and stockholder in the Commonwealth mine at Pearce, Arizona, is expected at the mine in a few days.

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CHLORIDE OF LIME.

English prime brands \$1.60@1.70, American, \$1.70@1.80; Continental F., \$1.50@1.60 per 100 lbs.

Acids.

Demands are good while stocks in maker's hands are comparatively small. Blue vitriol is scarce, and up to \$3.87½ is asked for the best grades, while ordinary kinds are hardly being offered. Imports included 95 bbls. and 30 casks oxalic.

Quotations are per 100 lb from New York and vicinity as follows: Acetic acid, commercial, No. 8, \$1.40@1.50; muriatic acid, 18°, \$1.10@1.15; 20°, \$1.20@1.25; 22°, \$1.35@1.40; according to quantity and brand. Nitric acid 36°, \$3.50@4.75; 38°, \$3.75@4.62½; 40°, \$4.00@4.87½; 42°, \$4.62½@5.25. Oxalic acid, \$6.50@6.75. Mixed acids, according to mixture. Sulphuric acid, 66°, \$1.10 for drums and \$1.15@1.75 for carboys. Chamber acid 50°, in jobbing way, \$11.50@12 per ton f. o. b. factory. Blue vitriol \$3.50@3.62½ for extra grades and \$3.37½ for ordinary.

BRIMSTONE.

Spot brimstone is very scarce, and small buyers are obliged to pay as high as \$24 and \$25 per ton for best unmixed seconds, and about \$1 less for thirds. Large buyers are however favored with much lower prices, and quotations by importers are \$22.50 and \$23 per ton for best unmixed seconds on spot, and \$21 and \$21.75 for futures; thirds are \$19.50 to \$20 to arrive.

NITRATE OF SODA.

Buyers and sellers of nitrate of soda are still to far apart to come to any large sales, though about 5,000 bags were sold recently at \$1.52½ per 100 lbs. Sellers are quoting up to \$1.55 for spot, and for futures extending through December, 1899, \$1.55 to \$1.57½ per 100 lbs.

FINANCIAL NOTES.

Average Prices of Metals

in New York per pound from January 1, 1898:

Month	Copper	Tin	Lead	Spelter
January.....	10.99	13.87	3.65	3.95
February.....	11.28	14.08	3.71	4.04
March.....	11.95	14.38	3.72	4.25
April.....	12.14	14.60	3.63	4.26
May.....	12.00	14.52	3.64	4.27
June.....	11.89	15.22	3.82	4.77
July.....	11.63	15.60	3.95	4.65
August.....	11.89	16.33	4.09	4.58
September.....	12.39	16.03	3.99	4.67
October.....	12.41	17.42	3.78	4.98
November.....				
December.....				

Average Monthly Prices of Silver.

In New York per ounce Troy, from January 1st, 1898, and for the years 1897 and 1896:

Month	1898	1897	1896
	Cents.	Cents.	Cents.
January.....	56.77	64.79	67.13
February.....	56.07	64.67	67.07
March.....	54.90	63.06	68.40
April.....	56.02	61.85	67.92
May.....	56.38	60.42	67.78
June.....	58.61	60.10	68.69
July.....	59.06	59.61	68.75
August.....	59.54	54.19	67.84
September.....	60.68	55.24	65.68
October.....	60.42	57.87	66.05
November.....		57.91	64.93
December.....		58.01	65.24
Year.....		59.79	67.75

The statement of the United States Treasury, on Thursday, Nov. 10, shows balances in excess of outstanding certificates as below, comparison being made with the statement for the corresponding date last week:

	Nov. 10.	Changes.
Gold.....	\$242,898,940	I. \$2,221,477
Silver.....	7,751,694	D. 359,442
Legal Tenders.....	17,026,953	D. 2,125,442
Treas'y Notes, etc.....	1,029,632	D. 96,988

Totals.....\$268,719,219 D. \$369,395
Treasury deposits with national banks amounted to \$95,967,248, an increase of \$1,444,306 during this week.

Gold and Silver Exports and Imports.

At all United States ports, September 1898, and year from January 1st, 1898 and 1897:

	SEPTEMBER, 1897	1898
Gold—		
Exports.....	\$142,922	\$1,102,810
Imports.....	4,733,181	16,820,041
Excess.....	I. \$4,590,259	I 13,717,231
Silver—		
Exports.....	\$4,582,478	\$5,157,103
Imports.....	3,084,624	2,505,803
Excess.....	E. \$1,497,854	E. \$2,651,300
	NINE MONTHS, 1897	1898
Gold—		
Exports.....	\$32,685,581	\$12,781,923
Imports.....	16,610,835	127,407,872
Excess.....	E. \$16,074,746	I. \$114,625,949
Silver—		
Exports.....	\$212,606,674	\$39,438,509
Imports.....	23,881,257	22,319,366
Excess.....	E. \$188,725,417	E. \$17,119,134

This statement includes the exports and imports at all United States ports, the figures being furnished by the Bureau of Statistics of the Treasury Department.

WANTS

Advertisements of this class containing not more than five lines will be inserted for not exceeding three months in any year, free of charge, to all paid-up annual subscribers. Other than above \$1.00 per month. Advertisements not accepted for less than one month.

WANTED POSITION of Assayer with Mining Company. Have had experience in Milling and Cyanide works besides technical chemical training. References given. Refractory ores treated by Bromo-Cyanide method. Address, Tye JOURNAL OFFICE.

WANTED, by a young man, a position as Assayer, etc.; experienced, competent and has a good knowledge of all metallurgical operations. Good references. Address, T. K. JOURNAL OFFICE.

EXPERIENCED Assayer and Cyanide operator desires engagement. The successful and economical treatment of silvery ore or tailings by cyanide a specialty. ADDRESS W. V. WATSON, Ely, White Pine Co., Nev

AN EDUCATED Chemist and Millman, thoroughly understands Milling, Chlorination and Cyanide Processes. Twelve years experience in Montana and Colorado, now open to an engagement. Moderate salary. Address: "Chemist" JOURNAL OFFICE.

MINING MAN of experience will develop Gold property of merit for ½ interest, or will bond whole mine and develop. Correspondence with owners only. Give full particulars. Will give satisfactory references. Address P. O. Box 887, Los Angeles, Cal.

FOR SALE!

A COMPLETE 20-stamp mill and equipment including assay office outfit, see ad page 24. Address: BOX 234, LORDSBURG, N. M.

WELL DEVELOPED Quicksilver property located in Western Texas. Has produced 4000 pounds of quicksilver. Address LOUIS LINDHEIM & Co., Del Rio, Texas.

I HAVE some good gold mining properties for sale at reasonable prices, some developed and some real good properties at Ward, Eldora, Gold Hill, Jamestown, Magnolia, Caribon and Sugar Loaf. Write stating what you want or call on me. JAMES M. NORTH, Former County Judge, BOULDER, COLO

ANTIMONY--BISMUTH

PROSPECTORS having locations of this nature and wishing to sell at once for cash, will do well to address with full particulars, P. O. Box 2078 SAN FRANCISCO, CAL.

A VERY valuable, extensive Lead Mining Property in Southern Virginia. Shafes sunk over 200 feet and actual work has demonstrated richness of veins and purity of ore. Address: GEORGE FRANK, Baltimore, Md.

OPPORTUNITY.

GOLD, COPPER AND IRON MINING is profitable and respectable when you have the pay ores to mine. Because of owning more than we can properly manage, we propose to lease one or more valuable mines on equitable terms. Call or write VAN ANDA COPPER & GOLD COMPANY, Inns of Court Building, Vancouver, B. C. Van Anda City, Texada Island, B. C. 65 Wall Street, New York City.

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National Steel Ore Car MANUFACTURER OF THE Repairing of All kinds Promptly Attended to. PORTLAND, OREGON

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Mining, Milling and Smelting Machinery

Estimates Furnished on all Classes of Mining Work

P. O. Box 296, STATION "C"

LOS ANGELES, CALIFORNIA

Bullock's Diamond Prospecting Core Drills

These are the only Machines which will give absolutely accurate records of borings. Fifteen styles and sizes. Operated by hand, horse, steam, air or electricity.

Monarch Rock Drills

Any style of mounting. Simple, compact, economical. Operated by air or steam

Hoisting and Haulage Machinery to fill any requirements.

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1169 West Lake Street,

CHICAGO, ILLINOIS

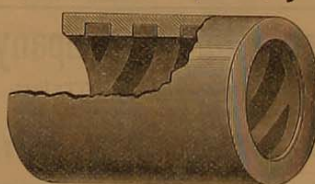
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Mining Engineer and Metallurgist

Laboratory, 214 Pine Street,

SAN FRANCISCO, CAL.

Oilless Bearings,



For

Rope Tramways, HOISTING Engines, Tackle Blocks, Cam Shafts in STAMP MILLS. A Practical BEARING that RUNS WITHOUT OIL

The Graphite

Lubricating Company

BOUND BROOK, N. J.

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One Hall's Patent Excavator 450 Spread, including Boiler and Lidgerwood Engines, (Double) 8"x8" Cylinder.
One 60 H. P. Locomotive Boiler and all necessary fittings.
One 50 H. P. Erie Engine and all necessary fittings.
One 50 H. P. Heater and Pump, (Boiler Feed).
One No. 8 Sand Pump, Hose and all connections.
One Copper Plate which is silver plated, 48"x60" and a lot of Piping, Seals, etc.
Plant now set up in place in New Mexico. Will sell for ½ original cost and guarantee to be in good order. If interested, correspond with

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Tel. Brown 1735

Los Angeles, Cal.

MINING STOCK QUOTATIONS

BOSTON			
Aetna Con	Gold Coin	10 00	
Allouez	3 50	Humboldt	4 50
Anaconda		Illinois Steel	71 75
Arcadian	22 00	Lake Sup Iron	—
Arnold	2 75	Merced	6 25
Ash Bed	2 50	National	—
Atlantic	26 50	New Idria Mfg	—
Baltic	16 50	Old Dominion	28 25
Bonanza	45	Oscoda	55 00
Boston & Mont	224 12	Parrott	23 50
Breece	1 50	Pioneer	5 25
Butte & Boston	23 00	Quincy	119 00
Calumet & Hecla	585 00	San Yael	5 00
Catalpa	—	Tamarack	173 00
Centennial	18 38	Tecumseh	3 00
Dominion Coal	25 00	Victor	8 00
Dominion Pref	112 50	Washington Ming	—
Franklin	14 00	Wolverine	28 00
NEW YORK.			
Alamo	03 1/2	Homestake	23 50
Alice	40	Iron Silver	—
Annetta	45	Mexican	30
Best & Belcher	60	Mollie Gibson	19
Brunswick	05	Ontario	4 50
Bulwer	—	Ophir	—
Crown Point	65	Pharmacist	10
Con. Cal. & Va.	—	Plymouth	—
Cripple Creek Con	08 1/2	Quicksilver	3 00
Deadwood	—	Quicksilver pfd	11 00
Favorite	11 25	Sierra Nevada	—
Fortuna	04	Standard	1 60
Golden Fleece	45	Union Con	—
Gould & Curry	45	Yellow Jacket	—
Hale & Norcross	—	—	—
SAN FRANCISCO.			
Alta Con	12	Mexican	15
Andes	13	Occidental	52
Belcher	21	Ophir	50
Best & Belcher	18	Overman	07
Bullion	10	Ontario	3 50
Caledonia	52	Plymouth	08
Challenge	13	Potosi	23
Chollar	10	Quicksilver	1 25
Confidence	40	Quicksilver pfd	4 00
Con. Cal. & Va	83	Savage	19
Crown Point	10	Seg. Belcher	03
Deadwood	45	Sierra Nevada	54
Gould & Curry	18	Silver Hill	10
Hale & Norcross	85	Standard	1 75
Homestake	50	Union Con	18
Iron Silver	68	Utah	08
Justice	08	Yellow Jacket	15

COLORADO SPRINGS STOCKS

Acacia	02 1/2	Isabella	23
Alamo	02 1/2	Jack Pot	07 1/4
American Con	01 1/2	Lille	—
Anaconda	37	Kimberly	02 1/2
Argentum Junia	20 1/2	Magnet Rock	01 1/2
Banner	—	Maton	29 1/2
Bob Lee	00 1/2	Mineral Rock	—
Creede & C Co	04	Mountain Beauty	01 1/2
Dante	04	Mollie Gibson	19 1/2
Des Moines	01 1/2	Moon Anchor	97
Elkton Con	98 1/2	Mount Rosa	12
El Paso	07 1/2	New Haven	02 1/2
Emma Almee	003	Oriole	008
Fanny R	21	Orphan Bell	66
Favorite	02 1/2	Peoples	01
Findley	05 1/2	Pharmacist	03 1/2
Flower of the Wrt	005	Pilgrim C	02
Franklin	003	Portland	1 18
Golden Crater	—	Pr. Albert	02 1/2
Golden Fleece	22	Rattler	01 1/2
Gold & Globe	01 1/2	Specimen	02 1/2
Gold King	55	Theresa	06
Gould & Curry	003	Trichy	02
Granite Hill	01	Union Gold	15 1/2
Hayden	004	Work	05 1/2
Ingham Con	04 1/2	—	—

SALT LAKE CITY

Alice	75	Little Pittsburgh	03 1/2
Ajax	68	Malvern	—
Alliance	10	Mammoth	2 10
Anchor	60	Maxfield	—
Buckeye	02	Mercur	6 97 1/2
Bullion Rock	5 50	Moigan	—
Cent. Eureka	29 00	Northern Light	08 1/2
Chloride Point	—	Omaha	52
Daisy	60	Ontario	5 25
Dalton	000	Overland	1 65
Dalton & Lark	04	Richmond Ana	—
Daly	00	conda	04 1/2
Daly West	4 00	Rover	—
Dexter	2 85	Sacramento	59
Eagle	07 1/2	Silver King	29 50
Eagle & Blue Bell	1 00	Sioux Con	—
Fear Aces	29	Sunbeam	05 1/2
Galena	44	Sunshine	45
Gemini	—	Swansea	2 82
Geyser-Marion	64	So Swansea	1 23
Grand Central	6 87 1/2	Utah	84 1/2
Homestake	—	Valco	58
Horn Silver	1 15	Young America	50

ROSSLAND, BRITISH COLUMBIA.

Alecta	10	Jumbo	37
Big Three	10	Knight Templar	05
Butte	01 1/2	Kootenay-London	10
Caledonia Con	05	Le Roi	8 50
California	15	Lilly May	19 1/2
Camp Bird	05	Mabel	15
Celtic Queen	05	Mayflower	08
Centre Star	—	Monita	14
Colonna	32	Monte Christo	31
Commander	10 1/2	Morning Star	08
Deer Park	18 1/2	Mugwump	05
Della Colla	02	Nest Egg	03
Delaware	12	Northern Belle	04 1/2
Eastern Star	20	Novelty	03 1/2
Enterprise	18	O. K	10
Eric	03 1/2	Palo Alto	02
Eureka Con	08 1/2	Phoenix	08
Evening Star	05 1/2	Poorman	13 1/2
Georgia	12 1/2	R. E. Lee	15
Gertrude	06	Red Eagle	08
Golden Drip	15	Red Mount View	09
Good Hope	02 1/2	Red Point	10
Grand Prize	02 1/2	Ross'd H'mest'ke	05
Great Western	09 1/2	Rossland, Red Mt.	21
Hattie Brown	03	St. Elmo	05
Hele	04	St. Paul	12 1/2
High Ore	04	Silver Bell	02 1/2
Imperial	10	Silverline	05
Iron Horse	07	So. Cross & W. Con	20
Iron Mask	1 00	Virginia	1 02
J. X. L.	10	War Eagle Con	2 75
Josie Mac	30	West Le Roi	28
Josie	30	White Bear	08

DENVER STOCK REPORT.

Aetna	001	Keystone	04 1/2
Anchorage Leland	57	Lille	99
Anaconda	37	Maton	22 1/2
Arcadia	01 1/2	Mollie Gibson	19
Argentum Junia	20 1/2	Moon Anchor	97 1/2
Banner	—	Mt. Rosa	12
Bob Lee	01	Old Gold	—
Elkton	38 1/2	Peoples	01
El Paso C	07 1/2	Pilgrim C	02
Enterprise	04 1/2	Pine Creek	003
Fanny R	21	Portland	1 18
Garfield Grouse	—	Prince Albert	01 1/2
Geo. Washington	002	Republic	02 1/2
Golden Eagle	29	Sacramento	02 1/2
Gold Coin	38	Smuggler	24
Gilpin & C C	40	Specimen	03 1/2
Gilpin Four	004 1/2	Tamarack	007
Golden Fleece	22	Union Gold	13 1/2
Isabella	23	Virginia M	02 1/2

Iron Clad	02 1/2	Wheel of Fortune	002 1/2
Jack Pot	03 1/2	Work	02 1/2

MEXICO

Name of Company	State	Price
Allianza	Hidalgo	5
Amistad y Concordia	"	24
Angustias	Guanajuato	390
Arevalo y Anexas	Hidalgo	240
Asturistas y Anexas	Zacatecas	170
Barradon y Cabras	Durango	150
Bartolome de Medina	Hidalgo	100
Cabezon y An	Zacatecas	30
Candelaria de Pinos	"	180
Capuzaya	Durango	120
Carman	Hidalgo	400
Castellana y San Ram	Tepec	25
Cerro Colorado	Chihuahua	10
Cinco Senores y An	Guanajuato	480
Concepcion y Anexas	S. Luis Potosi	100
El Oro	Guanajuato	40
Esparanza y An	Mexico	1,300
Guadalupe	Guanajuato	180
Huautla	Santa Ana	100
Luz de Borda	Michoacan	40
Luz de Maravillas	Hidalgo	100
Palablon	"	150
Palma	Zacatecas	100
Parisima de los Com.	"	5
Real del Monte	Hidalgo	900
Refugio y Va	"	8
Restauradora	Durango	60
San Francisco	Hidalgo	270
S. Fed. Chalcabuites	"	12
San Rafael y Anexas	"	925
do. Free Stock	"	400
San Rafael del Oro	Hidalgo	20
Sio. Maria de la Paz	S. Luis Potosi	650
Soledad	Durango	50
Sorpresas	Hidalgo	500
Trinidad	"	250
Union	Guanajuato	40
Uauzingo	Puebla	27
Veracruz	Hidalgo	280
Zomelahuacan (gold)	Vera Cruz	100
Zona Min. de Pozos	Guanajuato	15

NOTE—The above Mexican stocks are figured on the basis of Mexican silver

ORE TESTING

Complete mill for testing ores on practical scale by all processes to determine the best process adapted to treating any ore submitted. Processes in use investigated to overcome unnecessary losses, etc.

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Briggs' 2-Stamp Triple-Discharge Quartz Mill, of latest improved pattern, Rock Breakers, Ore Feeders, Concentrators, Engines and Boilers, Hoisting Rigs to be operated by Horse, Steam Power or any other motor; Ore Car and Ore Buckets, Cornish and Jack-head Pumps, Triple-Acting Pumps, Centrifugal Sand and Gravel Pumps, Wooden Tanks and Pumps for the Cyanide Process, Pipe and Gate Valves, Link Chain Elevators for elevating and conveying all kinds of material. Estimates as to cost of machinery and its erection furnished upon application. Write for Catalogue and Prices.

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Cyanide Plants erected and operated. Practical Working Tests made. Mines Examined and Purchased.

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The Southern California Lumber Co., Stimson Bldg., Los Angeles, Cal., Chas. Wier Manager, sells

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At Wholesale Prices

Mining Timbers a Specialty

Write for Prices

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AIR COMPRESSORS,
ROCK DRILLS,
Stone Channelers,
The Pohle Air Lift Pump,
Coal Cutters,

The Ingersoll-Sergeant Drill Co.,
HAYMEYER BUILD'G.
NEW YORK.

New Catalogue No. 32

New Catalogue No. 41

Pamphlet No. 100

Catalogue No. 72

Special.

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FRANK O. BECK, Sec'y and Treas.

THE PORTLAND GOLD MINING CO.,

(Stock Transfer Office, Colorado Springs.)

Mines at Victor, Colorado.

COLORADO SPRINGS, COLO., May 19, 1898.

The Ingersoll-Sergeant Drill Co.,

Gentlemen:—We bought two years ago one of the largest

size of the straight line type of Ingersoll-Sergeant Piston

Inlet Compressor.

This was found to be too small for our needs about a year

ago and we purchased of you a Duplex Cornish machine

16" x 18 1/2" x 42".

This was set in place in our shaft house in the Cripple Creek

District, 10,000 feet above the level of the sea, and has been

running continuously ever since, and at times over ten 3/4"

Eclipse drills. The steam cylinders were connected to an in-

dependent Jet Condenser, for which we are using the mine

water, and the resultant economy of operation is very

noticeable.

The operation of this Compressor is as near perfect as

that of any machine we have ever seen, and this type is well

worth the extra cost on account of the great permanent

economy in operation.

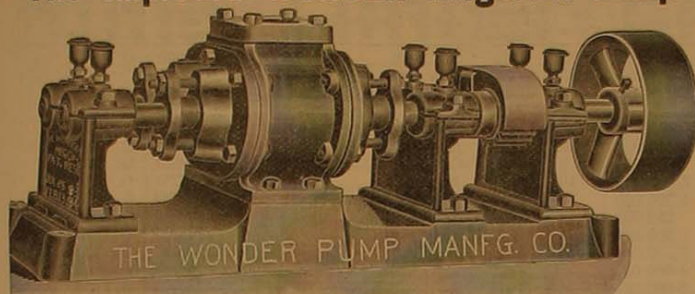
Our mine is equipped exclusively with your drills and we

have only the highest words of praise to give them.

Yours very truly, The Portland Gold Mining Co.,

Jas. A. Burns, President.

The Improved WONDER Irrigation Pump



We also Build Vertical Style for Mining Purposes.
Write for full particulars and Catalogue.

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**KANSAS CITY,
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Mine or Mill, as good as new, at the

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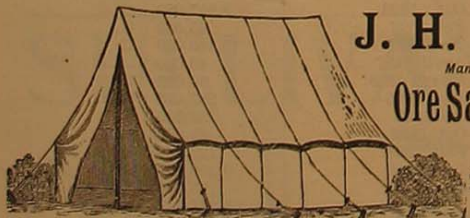
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Gasoline Engines from 2 to 10 horse
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Purchased. Special Attention paid to samples
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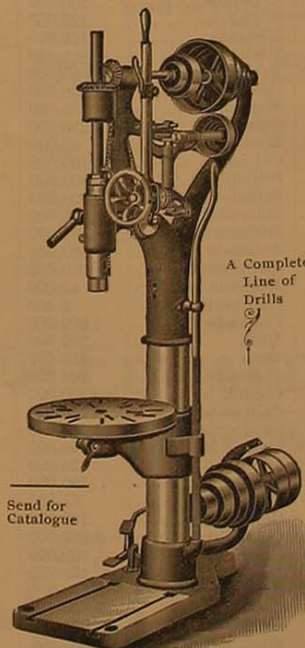
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Gold	\$.50	Copper	\$.100
Silver40	Gold, Silver and Lead...	1.25
Gold & Silver...	.75	Gold, Silver, & Copper...	1.50
Lead50	Gold, silver, copper, lead...	2.00

Samples by mail receive prompt attention.
Highest price paid for Bullion.

Ogden Assay Co.,

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Drills

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San Francisco by
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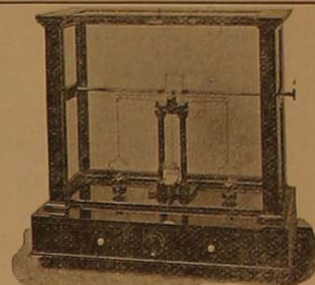
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Sensibility. 1-100 Milligramme

Ten inch beam on which you can weigh from
1-100 to 1 Milligramme with a 1 Milligramme
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published in the West of mining machin-
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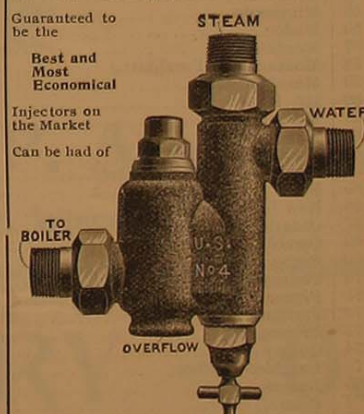
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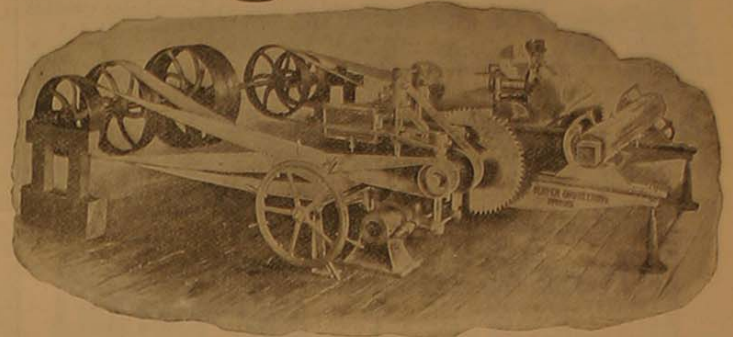
	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Minerals Produced
1	Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Oct 1898	\$ 150,000	Q.
2	Alaska, Trendwell	Alaska	200,000	5,000,000	25	37½	July 1898	3,550,000	G.
3	Alaska Mexican	Alaska	200,000	1,000,000	5	10	July 1898	299,031	G.
4	Alice	Montana	400,000	10,000,000	25	05	April 1898	1,075,000	G. S.
5	Alice	Utah	400,000	10,000,000	25	05	Sept 1898	2,525,000	S, L, G.
6	Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1898	6,750,000	C.
7	Anchoria Leland	Colorado	600,000	600,000	1	01	Oct 1898	162,000	G.
8	American Gold	Colorado	300,000	3,000,000	10	05	Sept 1898	336,000	G. S. L.
9	Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1898	780,000	S.
10	Bald Butte	Montana	250,000	250,000	1	03	Sept 1897	512,500	G, C, S.
11	Big Six	Colorado	500,000	500,000	1	00½	May 1898	15,000	G. S.
12	Boston & Montana	Montana	150,000	3,750,000	25	5 00	Aug 1898	8,375,000	G, C, S.
13	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Oct 1898	2,535,000	G. S.
14	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	Sept 1898	537,000	S. L.
15	Cariboo	British Col.	800,000	800,000	1	02	July 1898	220,965	G.
16	Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Sept 1898	54,850,000	C.
17	Centennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S. L.
18	Central Lead	Missouri	10,000	1,000,000	100	1 00	Sept 1898	66,980	L.
19	Champion	California	34,000	340,000	10	25	April 1898	296,200	G.
20	Charleston	S. Carolina	10,000	1,000,000	100	1 50	Sept 1898	165,000	
21	Chloride Point	Utah	500,000	500,000	1	01	Dec. 1897	5,000	G. S.
22	Colorado Smelting	Montana	100,000	1,000,000	10	50	July 1898	1,595,000	G, S, C.
23	Crescent	Utah	24,000	600,000	25		July 1897	280,000	
24	Crowned King	Arizona	600,000	6,000,000	10	02	Aug 1898	184,000	G, S, L.
25	Daly	Utah	150,000	3,000,000	20	25	Mar 1897	2,925,000	S, L.
26	Deadwood Terra	S. Dakota	200,000	5,000,000	25	05	May 1898	1,350,000	G.
27	De Lamar	Idaho	400,000	2,000,000	5	29	May 1898	2,451,600	S. L.
28	Elkton Consolidated	Colorado	1,250,000	1,250,000	1	01½	Oct 1898	636,961	G, S.
29	El Paso	Colorado	650,000	650,000	1	01	Jan 1898	12,093	G. S.
30	Empire State	Idaho	75,000	750,000	10	10	Aug 1898	15,000	
31	Fern	British Col.	200,000	200,000	1	05	Jan 1898	10,000	
32	Florence	Montana	500,000	2,500,000	5	01	May 1897	132,530	S.
33	Geyser-Marion	Utah	300,000	1,500,000	5	02	Sept 1898	96,000	G.
34	Gold Coin of Victor	Colorado	1,000,000	1,000,000	1	01	Oct 1898	120,000	G.
35	Golden Cycle	Colorado	20,000	1,000,000	5	00½	Aug 1898	155,000	
36	Gold Coin	Colorado	200,000	1,000,000	5	05	Nov 1897	160,000	G. S.
37	Gold and Globe	Colorado	750,000	750,000	1	3-10	July 1897	51,625	G.
38	Golden Reward	S. Dakota		1,000,000	15		Feb 1898	155,000	G.
39	Grand Central	Utah	250,000	250,000	1	12½	Oct 1898	156,000	G, S, C, L.
40	Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S, G, L, C.
41	Highland	S. Dakota	100,000	10,000,000	100	20	Sept 1898	3,724,718	G.
42	Holy Terror	S. Dakota	300,000	300,000	1	03	Aug 1898	108,000	G.
43	Homestake	S. Dakota	125,000	12,500,000	100	50	Sept 1898	6,993,750	S.
44	Hope	Montana	100,000	1,000,000	10	10	Mar 1898	762,252	G.
45	Horn Silver	Utah	400,000	10,000,000	25	05	Sept 1898	5,210,000	S, L.
46	Idaho	British Col.	500,000	500,000	1	05	May 1898	264,000	
47	Iowa	Colorado	1,000,000	1,000,000	1	00½	June 1898	90,000	G.
48	Iron Mountain	Montana	500,000	5,000,000	10	1 00	Jan 1898	501,100	S.
49	Isabella	Colorado	2,250,000	2,250,000	1	00½	June 1897	270,000	G.
50	Kearsarge	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C.
51	Kennedy	California	100,000	10,000,000	100	48	Aug 1898	1,796,000	G.
52	Last Chance	British Col.	500,000	500,000	1	04	Jan 1897	42,000	S. L.
53	Le Roi	British Col.	500,000	2,500,000	5	10	Apr 1898	775,000	G.
54	Lillie	Colorado	1,000,000	1,000,000	1	01	Sept 1898	134,110	G.
55	Minnesota	Minnesota	165,000	16,500,000	100	1 50	Oct 1898	4,735,000	I.
56	Modoc	Colorado	500,000	500,000	1	02	Nov 1898	75,0 0	G.
57	Montana Ltd	Montana	660,000	3,300,000	5	0½	May 1898	2,997,557	G, S.
58	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	July 1898	760,000	
59	Morning Star	California	2,400	240,000	100	5 00	June 1898	666,600	G.
60	Mt. Rosa	Colorado	1,000,000	1,000,000	1	02	Jan 1898	60,000	G.
61	Mercur	Utah	200,000	5,000,000	25	12½	Oct 1898	1,191,000	G.
62	Mammoth	Utah	400,000	10,000,000	25	05	Sept 1898	1,310,000	G, S, C, L.
63	Moon Anchor Gold	Colorado	600,000	600,000	1	07½	Nov 1898	261,000	G.
64	New York & Hon. Rosario	Central A.	150,000	1,500,000	10	10	July 1898	930,000	S, G.
65	Napa	California	100,000	700,000	7	20	Oct 1898	950,000	Q.
66	New Idria Quicksilver	California	100,000	500,000	5	20	Sept 1898	80,000	Q.
67	Ontario	Utah	150,000	15,000,000	100	75	Dec. 1897	13,542,500	S, L.
68	Osceola	Michigan	50,000	1,250,000	25	1 00	June 1898	2,272,500	C.
69	Parrot	Montana	230,000	2,300,000	10	30	July 1898	2,000,898	G.
70	Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Aug 1898	43,925	
71	Pioneer	California	100,000	1,000,000	10	12½	Aug 1898	37,500	G.
72	Portland	Colorado	3,000,000	3,000,000	1	03	Oct 1898	2,257,080	G, S.
73	Princess	Colorado	1,000,000	1,000,000	1	00½	Feb 1897	45,000	G.
74	Quincy	Idaho	100,000	2,500,000	25	3 50	Aug 1898	10,120,000	O.
75	Rambler-Cariboo	British Col.	1,000,000	1,000,000	1	02	April 1897	40,000	
76	Raven	Colorado	1,500,000	1,500,000	1	01	March 1898	20,000	G.
77	Reco	British Col.	1,000,000	1,000,000	1	10	Jan 1898	287,500	S, L.
78	Republic	Washington	1,000,000	1,000,000	1	03	Oct 1898	30,000	G.
79	Sacramento	Utah	1,000,000	5,000,000	5	00½	Oct 1898	82,000	G.
80	Santa Rosalia	California	100,000	100,000	1	10	Feb. 1898	125,000	G, S.
81	Small Hopes Consolidated	Colorado	250,000	5,000,000	20	10	June 1898	3,300,000	S.
82	South Swansea	Utah	150,000	150,000	1	05	Oct 1898	125,000	S, L.
83	Standard	California	200,000	20,000,000	100	10	Aug 1898	5,674,940	G, S.
84	St. Joseph	Missouri	30,000	3,000,000	10	1 50	Sept 1898	2,747,000	L.
85	Silver King	Utah	150,000	3,000,000	20	25	Oct 1898	1,725,000	S, L, G.
86	Slocan Star	British Col.	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	
87	Smuggler	Colorado	1,000,000	1,000,000	1	01	June 1898	1,035,000	S, L, Z.
88	Swansea	Utah	100,000	500,000	5	05	Oct 1898	121,500	S. L.
89	Tom Boy	Colorado	200,000	2,000,000	10	10	Dec 1896	600,000	G.
90	Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1898	5,330,000	C.
91	Victor	Colorado	200,000	1,000,000	5	10	Sept 1898	1,015,000	G.
92	Vindicator	Colorado	1,500,000	1,500,000	1	05	Oct 1898	187,500	G.
93	Western Mine Enterprise	Montana	500,000	500,000	1	20	Jan 1898	48,680	
94	War Eagle	British Col.	2,000,000	2,000,000	1	01½	Sept 1898	239,000	
95	Wolverine	Michigan	60,000	1,500,000	25	1 00	Oct 1898	60,000	C.
96	White Water	British Col.	125,000	625,000	5	32	April 1898	194,000	
97	Yellow Aster	California	100,000	1,000,000	10	03½	Aug 1898	118,789	G.

S, Silver. G, Gold. L, Lead. O, Copper. Q, Quicksilver. I, Iron.
 N. B.—Companies not listed have not paid a dividend for the last twelve months.

Z, Zinc.

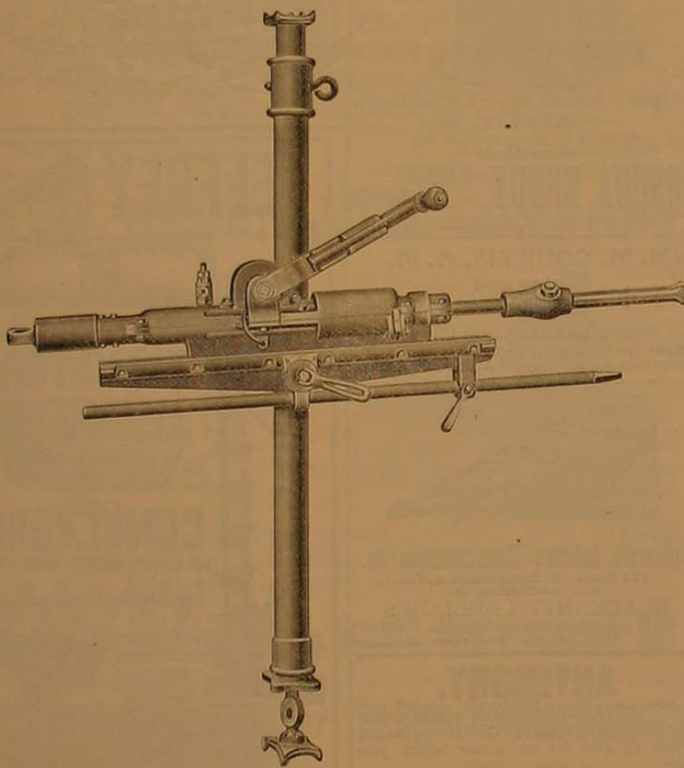
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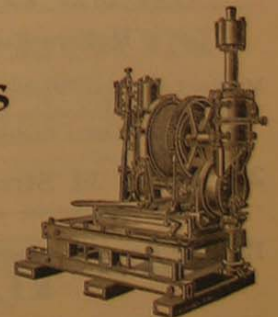
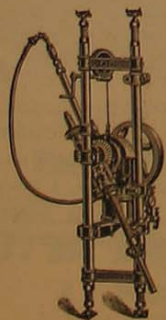
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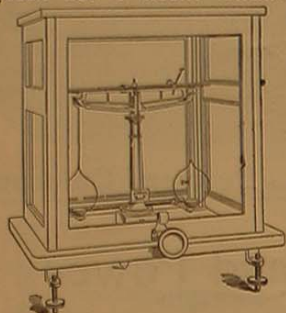
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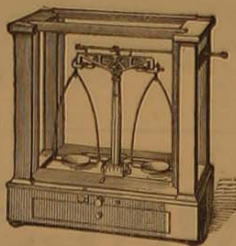
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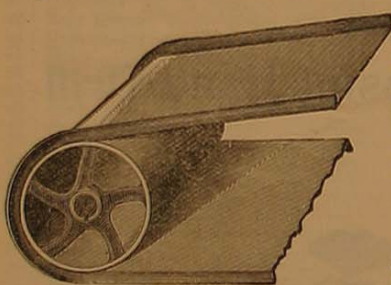


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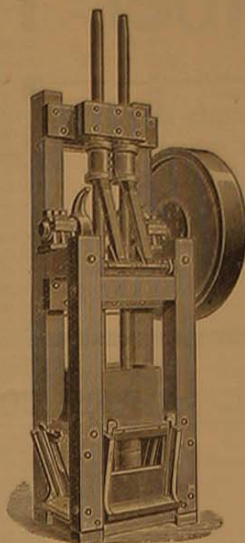
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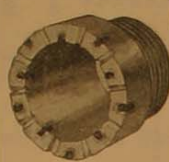
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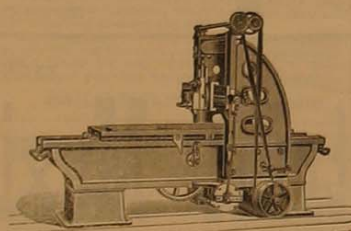
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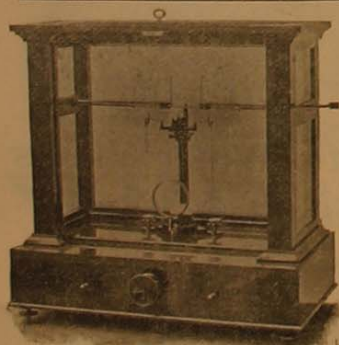
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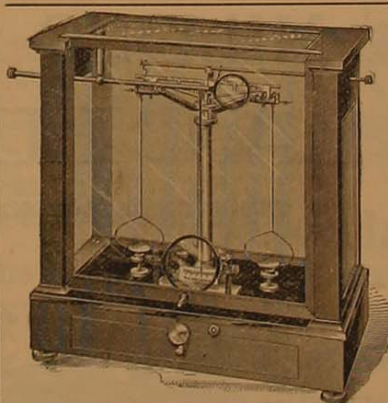
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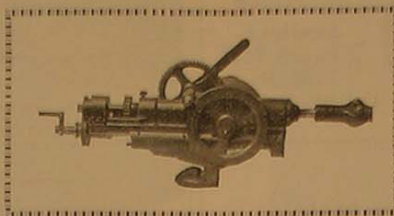
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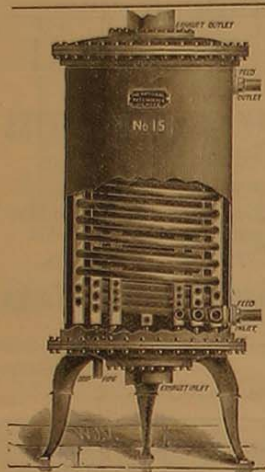
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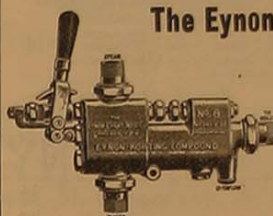
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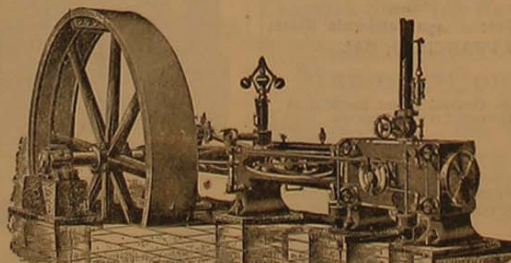
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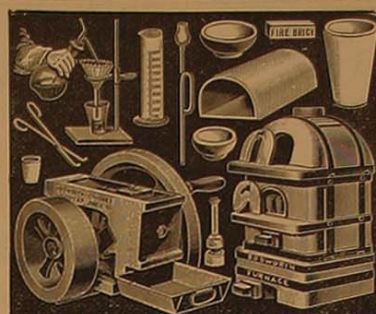
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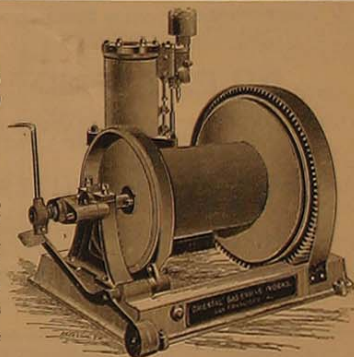
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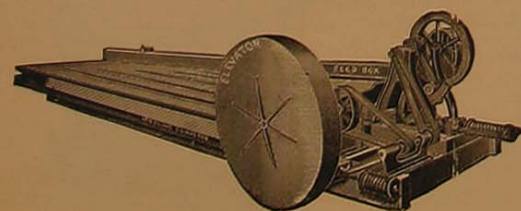
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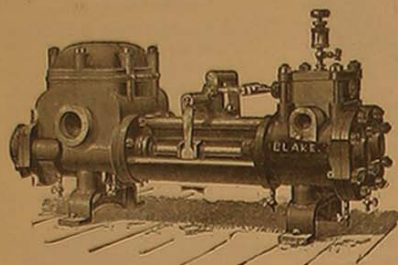
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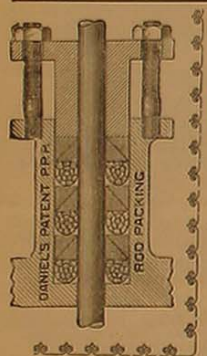
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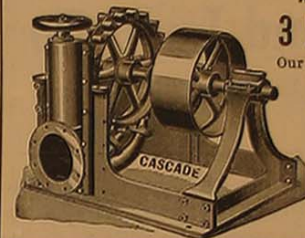
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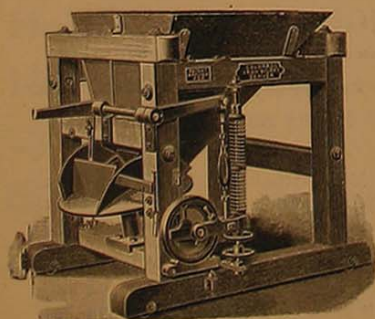
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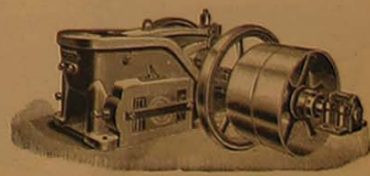
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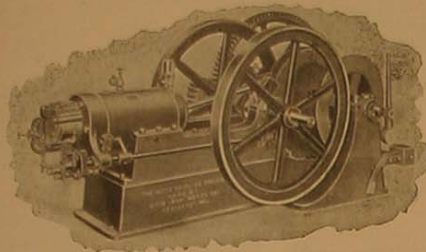


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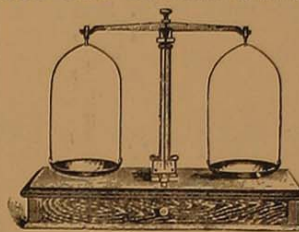
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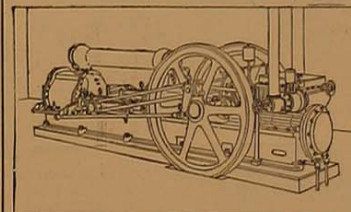
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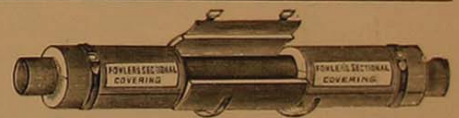
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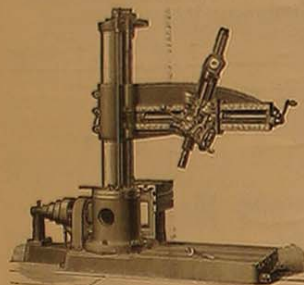
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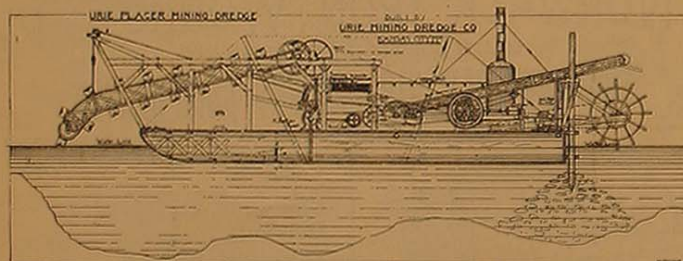
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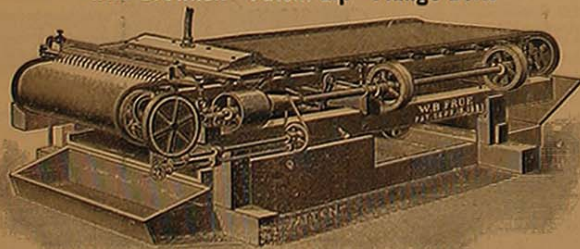
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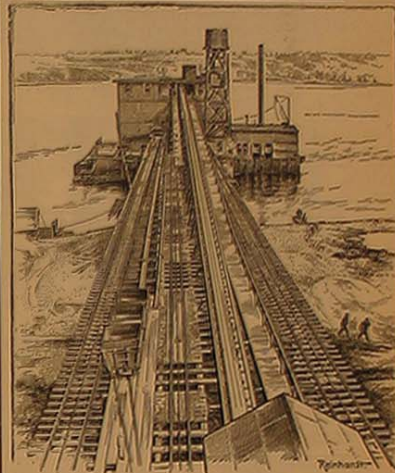
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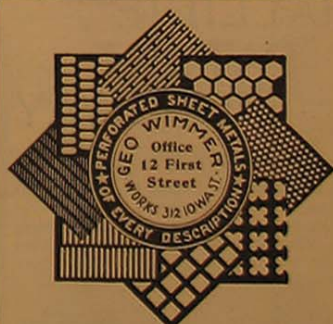
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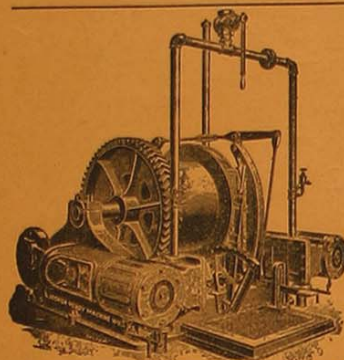
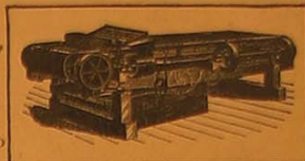
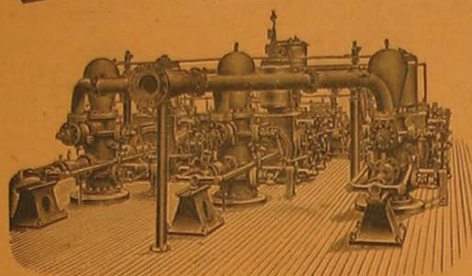
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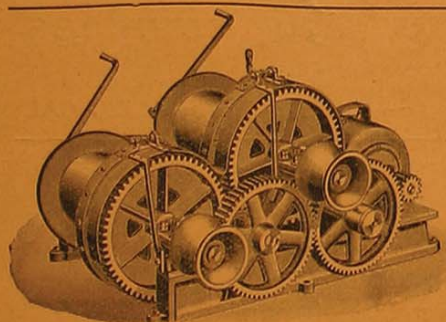
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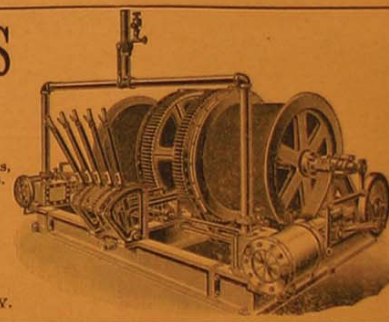
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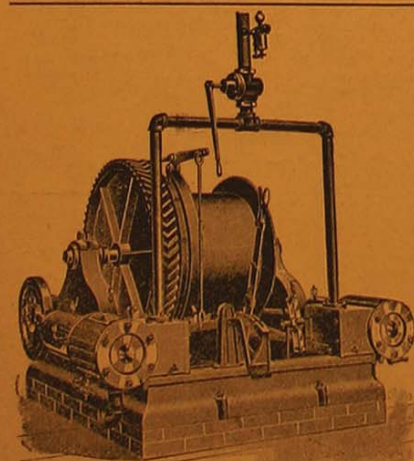
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